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No. ____

IN THE

Supreme Court of the United States

OCTOBER TERM, 1990

DIANE M. DILLON,

Petitioner,

v.

HARRY F. MANBECK, JR.
Commissioner of Patents and Trademarks,

Respondent.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

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QUESTIONS PRESENTED

35 U.S.C. § 103 provides that a patent may not be obtained "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter *as a whole* would have been obvious at the time the invention was made to a person having ordinary skill in the *art to which the subject matter pertains.*" (Emphasis Added)

The questions presented are:

Whether the Court of Appeals erred as a matter of law by expanding the statutory construction of the term "prior art" to include subject matter not pertinent to the art of the invention.

Whether the Court of Appeals erred as a matter of law by denying patent protection to a composition of a hydrocarbon fuel and a tetra-orthoester when the prior art indisputably fails to disclose *any* tetra-orthoester combined with *any* hydrocarbon, and when such composition includes "as a whole" the unexpected property of reducing particulate emissions (soot) upon combustion in an automotive engine.

Whether the Court further erred as a matter of law in concluding that art relating to transmission fluids "pertains" to an invention concerned with fuel combustion and the environmental impact thereof.

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PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

The petitioner Diane M. Dillon, assignor to Union Oil Company of California ("Unocal") respectfully prays that a writ of certiorari issue to review the judgment of the United States Court of Appeals for the Federal Circuit entered in the above-captioned proceeding on

November 9, 1990.[1] The question presented is purely a legal one. Because the Court of Appeals' decision is so clearly erroneous, this case is appropriate for summary reversal pursuant to Rule 23.1 of the Rules of this Court.

OPINIONS BELOW

The opinion of the Court of Appeals is reported at 919 F.2d 688 and is reprinted in the appendix ("Pet.App.") hereto, page 1a. The Court of Appeals issued its judgment as a mandate on November 30, 1990 (Pet.App. 92a).

Upon application for United States Letters Patent, the United States Patent and Trademark Office, Board of Patent Appeals and Interferences[2] affirmed rejection of the claims under 35 U.S.C. § 103. The PTO Board decision is not reported, but appears in the record below (Pet.App. 80a). An appeal to the United States Court of Appeals for the Federal Circuit was first heard by a panel thereof which reversed the decision of the PTO Board on December 29, 1989, and that decision was reported at 892

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[1] Pursuant to Rule 28.1 of the Rules of this Court, Union Oil Company of California, a corporation of California, states that is has no publicly owned subsidiaries or affiliates, but its parent company is Unocal Corporation, a corporation of Delaware.

[2] The United States Patent and Trademark Office is conveniently referred to sometimes as the "PTO," and the Board of Patent Appeals and Interferences is conveniently referred to sometimes as the "PTO Board."

F.2d 1554. Rehearing *in banc* was ordered May 21, 1990, and the panel judgment and opinion which was entered on December 29, 1989 was vacated and withdrawn (Pet.App 1a).

JURISDICTION

The jurisdiction of the Court of Appeals was invoked pursuant to 28 U.S.C. § 1295(a)(4)(A).

The decision of the Court of Appeals was entered on November 9, 1990. (Pet.App. 1a, 92a) Jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1).

STATUTE INVOLVED

35 U.S.C. § 103 provides as follows:

> A patent may not be obtained through the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The full text of 35 U.S.C. § 103 is set forth in petitioner's appendix (Pet.App 93a).

STATEMENT OF THE CASE

Union Oil Company of California holds the rights to the patent application of Diane M. Dillon which seeks claims covering a fuel additive with a hydrocarbon fuel which reduces particulate emissions or soot from the exhaust pipes of motor vehicles.[3] This fuel additive, a tetra-orthoester, dramatically reduces the soot which is created in the combustion process when combined with the fuel prior to combustion.

This Court is undoubtedly familiar with the sight of large diesel-operated trucks puffing black soot exhaust as they move on roads and highways. Concerned with the effects of the resulting air pollution, petitioner Diane Dillon sought a remedy to this well-known and long standing problem. She succeeded. She discovered that chemicals known as tetra-orthoesters, when added to fuels, lower the amount of soot produced during combustion. The significance of such a discovery in helping this nation deal with air pollution is self-evident. Reducing air pollution concomitantly reduces diseases caused by, or exacerbated by, air pollution, e.g., bronchial asthma, emphysema, chronic eye problems, and cardiovascular problems.

While tetra-orthoesters are a known class of chemical compounds, it is undisputed that their combina-

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[3] Application for Patent titled Hydrocarbon Fuel Composition, Serial No. 671,570 filed November 15, 1984, which is a continuation-in-part of Application Serial No. 453,494 filed December 27, 1982. The Claims denied are set forth in petitioner's appendix. (Pet.App. 94a-98a)

tion with hydrocarbon fuel, for any purpose, is *not* shown in the prior art, and that their use to reduce particulate emissions from combustion of hydrocarbon fuel is *not* shown or suggested in the prior art. (Pet.App 3a)

The PTO Board held all of the claims to be unpatentable on the ground of obviousness, 35 U.S.C. § 103, in view of two separate Sweeney patents, U.S. 4,390,417 ('417) and U.S. 4,395,267 ('267). Sweeney '417 described hydrocarbon fuel compositions containing specified chemical compounds including a tri-orthoester[4] for "dewatering" fuels, particularly diesel oil. Sweeney '267 described three-component compositions of hydrocarbon fuels heavier than gasoline, immiscible alcohols, and tri-orthoesters, where the tri-orthoesters serve as cosolvents to prevent phase separation between fuel and alcohol.

The PTO Board explicitly found that neither of the Sweeney patents taught the use of the tetra-orthoesters recited in petitioner Dillon's claims (Pet.App. 4a). The Court of Appeals agreed (Pet.App. 6a).

But the PTO Board cited Elliott, U.S. Patent 3,903,006, and certain other patents, including Howk, U.S. Patent 2,840,613, as secondary references holding that the Elliott reference showed an equivalence between tetra-

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[4] Tri-orthoesters have three -OR groups bonded to a central carbon atom, and the fourth carbon bond is to hydrogen or a hydrocarbon group (-R); they are represented as $C(R)(OR)_3$ Tetra-orthoesters have four -OR groups bonded to a central carbon atom, and are represented as $C(OR)_4$. See Dillon's claims. (Pet.App 94a)

orthoesters and tri-orthoesters. Elliott described tri-orthoesters and tetra-orthoesters for use as water scavengers in transmission fluids which were described as hydraulic (non-hydrocarbon) fluids. The PTO Board stated:

> "it is clear from the combined teachings of these references . . . that [Dillon's tetra-orthoesters] would operate to remove water from non-aqueous liquids by the same mechanism as the orthoesters of Sweeney." (Pet.App. 85a-86a)

From this it was concluded that there was a "reasonable expectation" that the tri- and tetra-orthoester fuel compositions would have similar properties, based on "close structural and chemical similarity" between the tri- and tetra-orthoesters.[5]

The Court of Appeals dismissed petitioner's argument that 35 U.S.C. § 103 precludes reliance on Elliott because his teachings pertain to *non* hydrocarbon transmission fluids while the claimed invention pertained to fuel combustion and the environmental impact thereof.

The *in banc* decision of the Court of Appeals held that structural similarity between claimed and prior art subject matter, where the prior art gives any reason or motivation to make the claimed compositions, creates a

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[5] Dillon's tetra-orthoester is not a homolog of the tri-orthoester nor is it an isomer. The majority opinion simply describes the tri-orthoester and tetra-orthoester structures as having "a sufficiently close relationship" (Pet.App. 6a, 35a).

prima facia case of obviousness (Pet.App. 7a).[6] The *in banc* majority went on to state:

> "Each situation must be considered on its own facts, but it is not necessary in order to establish a *prima facia* case of obviousness that both a structural similarity between a claimed and prior art compound (or a key component of a composition) be shown and that there be a suggestion in or expectation from *the prior art* that the claimed compound or composition will have the same or a similar utility *as one newly discovered by applicant*." (Pet.App. 8a)

In the view of the *in banc* majority of the Court of Appeals, Section 103 should be interpreted not by reference to what the prior art discloses to one of ordinary skill in the art, but rather by appearance and speculation. Thus, the Court of Appeals ignored the language of the statute and the *Graham* standards in determining obviousness.

The decision of the Board of Patent Appeals and Interferences was first reversed by a panel of the Court of Appeals and the Patent and Trademark Office timely sought rehearing and rehearing *in banc*. Because of the importance of the court's holding, numerous *amicus* briefs

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[6] A *prima facie* case is one that allows the conclusion of unpatentability as a matter of law. *Black's Law Dictionary*, 1071 (5th Ed. 1979); *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). See also *In re Mills*, 281 F.2d 218, 222 & n.2 (CCPA 1960).

were submitted by manufacturers and bar associations supporting the first *Dillon* decision and the Panel denied rehearing without opinion on February 28, 1990. However, the full court vacated the panel decision and recalled the mandate on May 21, 1990. Thereafter the Court of Appeals *in banc* issued the decision from which this petition is taken (Pet.App. 1a).

Judge Newman dissented from the decision of the Court of Appeals on the grounds that the

> "court not only rejects the weight of precedent, but also errs in the application of 35 U.S.C. §§ 101, 102, and 103" (Pet.App. 23a).

Judge Newman further stated:

> "In accordance with the court's *in banc* holding, a new chemical compound or composition is not patentable even when the prior art does not suggest that the chemical compound or composition would have the applicant's newly discovered property and use, unless the applicant makes the same showing that is required when the prior art does suggest the applicant's new property and use.
>
> "The applicant is thus required to show 'unexpected' properties and results, *whether or not* the prior art provides an expectation or suggestion of the properties and results disclosed in the patent application. And unless the applicant proves that the prior art structure does not actually possess the

> same unobvious property that the applicant discovered for the new structure, the court holds today that the new chemical compound or composition is not patentable. This is an incorrect application of the patent statute, and a rejection of the wisdom of precedent" [Footnotes Omitted] (Pet.App. 25a-26a).

REASONS FOR GRANTING THE WRIT

I. Certiorari is Necessary to Correct the Court of Appeals' Clear Error on a Matter of National Importance

This is not just an ordinary patent case. It involves the construction of a federal statute that will have, unless reversed, a significant negative impact on investment in research and development and on the pace of innovation in valuable new compositions of matter. When Congress enacted Section 103 as part of the overhaul of the federal patent laws almost forty years ago, it intended to create a standard of non-obviousness upon which the public could rely. Moreover, because all appeals concerning patent matters are within the exclusive appellate jurisdiction of the Federal Circuit pursuant to 28 U.S.C. § 1295, the development of new chemical compositions will be changed irretrievably in a manner never anticipated by Congress if this Court does not grant certiorari now.

This Court should grant certiorari for several persuasive reasons discussed in detail below. As Judge Newman stated in her dissent from the decision below,

this case "not only rejects the weight of precedent, but also errs in the application of 35 U.S.C. §§ 101, 102, and 103" (Pet.App. 23a). By doing so, the Court of Appeals has ignored the standards set forth by this Court in *Graham v. John Deere Co.*, 383 U.S. 1 (1966)], "factors [which] can not be ignored in determination of the *prima facie* case under 35 U.S.C. § 103" [Footnote Omitted] (Pet.App. 28a).

This Court has granted certiorari in cases decided by the Federal Circuit when important statutory issues were raised, and Congress clearly intended that such access to this Court would be available. *See, e.g., Cornelius v. Nutt*, 472 U.S. 648 (1985); H.R. Rep. No. 312, 97th Cong., 1st Sess. 18-19 (1981). The Court of Appeals' egregious error and the substantial adverse effect of that error on the patent laws make this case appropriate for review by this Court.

The need for review is confirmed by the substantial judicial disagreement over the interpretation of Section 103 and the standards for non-obvious subject matter. Circuit Judge Newman, who was joined by Circuit Judge Mayer and Senior Circuit Judge Cowen, dissented sharply from the *in banc* majority decision. Prior to the Court of Appeals decision, consideration of obviousness required the Patent Office and the Courts to consider as a part of the invention "as a whole" under 35 U.S.C. § 103 all relevant factors, including the properties of the composition and the particular problem to which the invention is directed.

The Court of Appeals' decision constitutes impermissible judicial legislation. The decision substantially erodes the possibility of patent protection for composi-

tions which have new and unexpected properties not known in the prior art.

II. The Court of Appeals' Decision is Directly Contrary to the Statutory Language, Legislative History and Federal Patent Case Law

The standard for non-obvious subject matter as set forth in the statute is measured by differences -- differences between the subject matter sought to be patented and the prior art known by one having ordinary skill in the art to which the inventive subject matter pertains. In the language of Section 103:

> "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the *differences* between the subject matter sought to be patented and the prior art are such that the *subject matter as a whole* would have been obvious at the time the invention was made to a person *having ordinary skill in the art to which said subject matter pertains*." [Emphasis Added]

The ordinary meaning of the statutory language establishes a standard to be employed by determining what was in the prior art and what "a person having ordinary skill in the art to which *said subject matter pertains*" would understand from that art. Here the *in banc* Court of Appeals' majority found that while tetra-orthoesters were a known class of chemical compounds, it is "undisputed that their combination with hydrocarbon fuel, for any purpose, is not shown in the prior art, and that their use

to reduce particulate emissions from combustion of hydrocarbon fuel is not shown or suggested in the prior art" (Pet.App. 3a).

That should have been the end of the matter. But the Court of Appeals, ignoring what one of ordinary skill in the art of fuel combustion and/or reducing environmental pollutants could know, concluded that a structural similarity between the admittedly new Dillon tetra-orthoester and prior art tri-orthoester compositions -- where the prior art taught that both were useful for water scavenging -- gave reason or motivation to make the claimed composition creating a *prima facie* case of obviousness (Pet.App. 6a).

If Congress or this Court had intended to provide a standard which was not limited to what one of ordinary skill in the fuel combustion art knew, then the language of the statute would *not* have contained the phrase "to which *said subject matter pertains*" [Emphasis Added] and the *Graham* standard of this Court would not have included the requirement that a determination of obviousness required a finding of the level of ordinary skill in the pertinent art.

But Congress did use clear language to identify the basis for evaluation, and this Court affirmed that standard in its decision in *Graham*, to the end that it is clear that in evaluating obviousness, the novel properties of a composition must be considered in making the factual evaluations set forth by *Graham* in evaluating patentability under the statute.

Nevertheless, the Court of Appeals held that the two Sweeney patents teaching the use of tri-orthoesters

for scavenging water in diesel fuel and the Elliott patent teaching the equivalence of tri-orthoesters and tetra-orthoesters for scavenging water in hydraulic fluids made the invention obvious under the statute thus denying petitioner's patent rights.

This decision contradicts both the clear mandate of 35 U.S.C. § 103 that an invention be evaluated from the perspective of "a person having ordinary skill in the art to which the subject matter pertains" as well as the standards of *Graham* which affirm the requirement that the differences between the prior art and the claims at issue be determined as well as the level of ordinary skill in the pertinent art. Unless reconciled with both the statute and precedent, the Court of Appeals' decision can only lead to extreme uncertainty with regard to fundamental issues of patentability and patent validity.

While the issue is unique to the patent law, its resolution is crucial to essentially all areas of research and commerce. Without clear guidance on the question of "available" prior art, now lacking due to the contradiction between the Court of Appeals' decision and the 35 U.S.C. § 103 standards of obviousness taken with *Graham*, there can be no certainty on the question of patentability under 35 U.S.C. § 103, and the answer to that question is critical to the allocation of literally billions of dollars for research and market development. Thus, the decision below impacts not only petitioner Dillon, it impacts all of this country's investment in research and commerce, and petitioner submits that the resolution of that decision with the patent statutes and precedent is, therefore, imperative.

Petitioner has been unjustifiably denied a patent for the reason that the Court of Appeals found her

invention pertaining to diesel fuel combustion properties obvious in light of the Elliott patent which pertains to hydraulic fluids, e.g., transmission fluids and the like. This conclusion is in conflict with this Court's long standing recognition, codified in 1952 in 35 U.S.C. § 103, that an inventor cannot be charged with knowledge pertaining to fields clearly outside his or her realm of endeavor.

Specifically, the Court of Appeals has found the petitioner's invention obvious within the meaning of 35 U.S.C. § 103 based on Sweeney '267 or '417 in combination with Elliott. Elliott was clearly needed to show tri-orthoesters and tetra-orthoesters, but because Elliott is directed to transmission fluids and the like and offers nothing reasonably directed to fuels or remotely related to petitioner's problem of reducing the amount of soot formed when hydrocarbons are combusted, petitioner submits that if the *Graham* standards are to apply, the Elliott reference is unavailable under 35 U.S.C. § 103 for it is not *prior art* under the statute and, thus, cannot be used to properly reject petitioner's claims.

Section 103 precludes a patent from issuing for an invention if the "subject matter *as a whole* would have been obvious ... to a person having ordinary skill in the *art to which said subject matter pertains*." The emphasized portion focuses on a point long recognized by this Court in patent matters -- at least since (1895)[7] -- that an inventor cannot be denied a patent based on information in a document, public or otherwise, that would not have been considered by one of ordinary skill in the art to which the subject matter pertains. This standard has

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[7] *C&A Potts & Co. v. Creager*, 155 U.S. 597 (1895)

continued to be the law through *Graham* and its progeny to this day. A prior art reference must lie in an art analogous to that of the invention; references in non-analogous arts are *not* prior art for the purposes of Section 103.

In *Graham*, this Court recognized that 35 U.S.C. § 103 placed "emphasis on the *pertinent* art existing at the time the invention was made ... ." *Graham*, 383 U.S. at 14 [Emphasis Added]. But further recognizing that modern science has grown, and that the information available to those of ordinary skill in the art has considerably increased the pertinent art over the years, this Court further pointed out in the *Graham* decision:

> "[T]he ambit of applicable art in given fields has widened by disciplines unheard of a half-century ago ... He who seeks to build a better mousetrap today has a long path to tread before reaching the Patent Office." 383 U.S. at 19

The question presented by this case is whether there is any path left, for here, petitioner, the patent applicant inventor, was concerned with an invention relating to the combustion of hydrocarbon fuels, only to have the Court of Appeals decide that she should be charged with knowledge of a patent in the art of non-hydrocarbon hydraulic fluids.

Petitioner believes that under the federal patent law, any analysis which leads to the conclusion that transmission or brake fluids are pertinent to combustion fuels -- and any rule established by case decision which leads to such conclusion -- must be in error.

The statutory language of Section 103 "is cast in relatively unambiguous terms. Patentability is to depend, in addition to novelty and utility, upon the 'non-obviousness' nature of the 'subject matter sought to be patented' to a person having ordinary skill in the *pertinent* art." *Graham*, 383 U.S. at 14 [Emphasis Added]

Federal law has followed this dictate and the Court of Appeals itself and it predecessor, the United States Court of Customs and Patent Appeals, established a two step test to determine whether a reference was to be considered a part of the *pertinent art* which is said to be analogous art. The test is as follows:

> (1) was the reference within the field of the *inventor's* endeavor? If not,
> (2) was the reference reasonably pertinent to the particular problem with which the *inventor* was involved.[8]

This two step *Deminski* test of the Court of Appeals focuses on the inventor. Both ends of this two-step test are directed to the *inventor's* endeavor and the *inventor's* problem and are consistent with the standards of Section 103. Petitioner raised the *Deminski* test before the PTO Board only to have the PTO Board ignore it (Pet.App. 85a-86a). The Court of Appeals while paying lip service to the *Deminski* test, held that prior art teachings of tri-orthoesters as water scavengers in fuels created a nexus between other teachings of water scavengers which suggest that tri-orthoesters and tetra-orthoesters are equivalent for

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[8] *In re Deminski*, 796 F.2d 436 (Fed.Cir. 1986); *In re Wood*, 599 F.2d 1032 (CCPA 1979).

water scavenging. From this the Court of Appeals concluded that soot reduction employing tetra-orthoesters was obvious (Pet.App. 11a).

The two step test of *Deminski* sets forth a reasonable way to determine if a reference is associated with the "ordinary skill in the art to which said subject matter pertains" standard of Section 103 and *Graham*. The error of the Court of Appeals decision is, that by ignoring the requirement of nexus, any problem or any feature discussed in a reference bearing on any other problem or feature discussed in a reference can be legally determined to the within the field of the inventor's endeavor. This leads to the preposterous result of the present case. The *in banc* Court of Appeals majority stated:

> "Following that test, one concerned with the field of fuel oils clearly is chargeable with knowledge of Sweeney '417, which discloses fuel compositions with tri-orthoesters for dewatering purposes, and chargeable with knowledge of other references to tri-orthoesters, including for use as dewatering agents for fluids, *albeit other fluids*. These references are 'within the field of the inventor's endeavor.'" (Pet.App. 11a)

The decision fails to explain how this conclusion meets the requirements of Section 103 that the alleged prior art teaching be "in the art to which said subject matter pertains."[9] A teaching of water scavenging bears no

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[9] The *in banc* majority decision simply stated:

relationship to soot reduction, and any legal conclusion relating to soot reducing materials based upon water scavenging teachings, without a suggestion or teaching in the prior art is a violation of the standard of 35 U.S.C. § 103.

Considering that both ends of the two-step test were directed to the *inventor's* endeavor and the *inventor's* problem, petitioner felt safe in the belief that no one could reasonably consider a reference pertaining to non-hydrocarbonaceous hydraulic fluids (Elliott) as offering anything which would place it within the field of endeavor for one concerned with the combustion properties of hydrocarbon fuels. Likewise, such a reference could offer nothing directed to petitioner's specific problem -- i.e., how to reduce the amount of soot produced when a hydrocarbon fuel such as diesel fuel is combusted.

Yet both the PTO Board and the Court of Appeals found the Elliott reference to be analogous art -- but for different reasons. The PTO Board held the Elliott reference to be within the field of endeavor of this petitioner because both Elliott and Sweeney (the latter a reference admittedly within the field of endeavor) contained teachings relating to using orthoesters to scavenge water. The Court of Appeals followed a different course; it argued that petitioner was chargeable with knowledge of

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"Appellant attacks the Elliott patent as non-analogous art, being in the field of hydraulic fluids rather than fuel combustion. We agree with the PTO that the field of relevant prior art need not be drawn so narrowly." (Pet.App. 10a)

Sweeney '417 (again, a reference admittedly within the field) teaching tri-orthoesters and fuels, and that therefore she is "*chargeable with knowledge of other references to tri-orthoesters*, including for use as dewatering agents for fluids, albeit other fluids." (Pet.App. 11a)

Such reasoning leads to absurd results, and in this case, to the conclusion that a reference related to transmission fluids somehow is in the field of endeavor of *this* inventor whose invention pertains to the properties of fuel combustion and whose invention solved a problem nowhere remotely suggested in Elliott. The Court is asked to note the broad sweep of the language quoted and underlined above: the petitioner is "chargeable with knowledge of other references to tri-orthoesters" -- simply because Sweeney teaches a tri-orthoester in *his* fuel. Sweeney teaches many other things as well -- water, acid resins, steel wool, metal shavings, beads, catalysts, conductivity meters, etc. -- so by the lower court's reasoning, all other references teaching any one of these features now enter the field -- no matter how unrelated to combustion and fuels such other references might be. And the Court should fully understand what happens once these other references enter the field. Following the logic of the lower court, all references which contain a teaching related to any one of these "other" references likewise enter the field. In other words, by the same method which dragged the Elliott patent into the field by Sweeney's teachings, so also could many other irrelevant references be drawn in based on Elliott, and so on, the references thus multiplying like the proverbial rabbits. By the Court of Appeals's logic, it would be the rare case indeed in which a reference could be found *not* within the field.

Petitioner submits that there is nothing erroneous about the two-fold test in *Deminski* and *Wood*; these cases set forth a reasonable way to determine if a reference is analogous art. The problem is that the Court of Appeals has misapplied the test by an analytical process that, of necessity, would allow for manifestly non-pertinent art to somehow become pertinent. In doing so it has rewritten Section 103 substantially eroding the intent of Congress in defining non-obvious subject matter.

The crucial error, from petitioner's point of view, is that both the Board and Court of Appeals have failed to see that, by their analysis, the field encompasses any reference bearing on *any* problem or *any* feature discussed in a reference legitimately within the field of the inventor's endeavor -- which leads to the preposterous result of the present case. Petitioner therefore submits that her field of endeavor is much more limited than proposed by the PTO and Court of Appeals. The field of this inventor's endeavor -- like that of Sweeney's -- is limited to those prior art publications which *themselves* contain a teaching specific to fuels or combustion chemistry. Accordingly, the Elliott patent is not within the field of endeavor of either the petitioner or Sweeney. However, because Elliott has a teaching relating to scavenging water, which is the same as one of the problems Sweeney addressed his invention to solving, Elliott becomes available with reference to the Sweeney invention -- but *not against petitioner's*. There being absolutely nothing in Elliott which relates to a problem confronted by the petitioner -- and in particular to her main problem of minimizing soot production during combustion of a hydrocarbon fuel -- the Elliott patent fails both parts of the two part test of the Court of Appeals. The Elliott

patent therefore becomes unavailable against her invention.

Additionally, the petitioner must note that the Court of Appeals, through its predecessor the CCPA, recognized that this Court's decisions in *C&A Potts & Co. v. Creager*, *supra*, and *Graham*, *supra*, drew a close connection to the doctrine of nonanalogous art and the doctrine forbidding hindsight reconstruction. *In re Van Wanderham*, 154 U.S.P.Q. 20, 24 (CCPA 1967). The Court of Appeals has also recognized that the tendency to resort to hindsight is "insidious" -- even when one least realizes it, a hindsight mind set has been required to find an invention "obvious" *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 220 U.S.P.Q. 330, 312-313 (Fed.Cir. 1984). Petitioner submits that in this case the Court of Appeals has fallen victim to hindsight. No other explanation truly can explain why it could find this inventor chargeable with knowledge that is so divorced from her field of endeavor or the problem she confronted. And just as the patentee-inventor in *C&A Potts & Co. v. Creager* used something from a non-analogous art "for a totally distinct and different purpose" [*Potts*, 155 U.S. at 606], so also has this inventor used a tetra-orthoester for a totally different and distinct purpose from Elliott, and any of the prior art relied upon by the PTO Board and the Court of Appeals. This petitioner is clearly entitled to a patent, which has been unjustifiably denied her.

In conclusion, petitioner submits that, contrary to the Court of Appeals' decision, not *all* references teaching orthoesters for any purpose are within the field of *her* endeavor, but only those references which by *their* teachings, reasonably relate to fuels or fuel combustion. And as petitioner sees it, the Court of Appeals has erred in so

widening the field of the inventor's endeavor to the point that it manifestly includes publications that no one of ordinary skill in the art would turn to for help in solving her problem. More specifically, by the manner in which the Court of Appeals has applied its two-part test, the end result is that almost any reference can ultimately be made pertinent. The Federal Circuit has, in effect, written out of 35 U.S.C. § 103 the requirement that the prior art relied on must be something which would pertain to the subject matter of the invention.

The petitioner therefore asks the Court to conclude that the Elliott patent is in fact non-analogous art which is unavailable as prior art under 35 U.S.C. § 103. And because the Elliott patent was essential to the lower court's finding of obviousness under 35 U.S.C. § 103, the petitioner further asks the Court to reverse the lower court's ruling that the invention is unpatentable under 35 U.S.C. § 103.

The standard of Section 103 and *Graham* require that a determination be made of the scope and content of the prior art, the differences between the prior art and claims at issue, and the level of ordinary skill in the pertinent art [*Graham*, 383 U.S. at 17]. Only disclosures which by their teachings show that they are relevant to that problem which the inventor faces are within the "ordinary skill in the art to which said subject matter pertains."

In this case, not all references teaching orthoesters for any purpose are within the field of her endeavor, but only those references which, by their teachings, reasonable relate to environmental considerations or fuel combustion.

The Court of Appeals has erred for by its failure to apply the statutory law of Section 103 and *Graham* dictates, it has, in effect written out of Section 103 the requirement that the prior art relied upon must pertain to the subject matter of the invention.

III. An Exceptionally Important Federal Statutory Issue Is Before This Court

This case raises a federal statutory issue of exceptional national importance. The Court of Appeals in determining that the properties of a composition should not be considered as a part of the test of non-obviousness results in patents not being obtained. This loss of patent right is significant.

Millions of dollars are expended in research in medical, environmental, and chemical research based upon the expectation that reasonable patent protection can be obtained where new compounds and compositions of matter having previously unknown properties are uncovered. Here Unocal had a reasonable expectation that patent protection would be available for the results of Diane Dillon's research into how to reduce soot belching from the exhaust stacks of trucks and busses. Yet, by the decision of the *in banc* majority of the Court of Appeals, that expectation was dashed because of irrelevant technology in the art pertaining to water scavenging in transmission fluids.

The Court of Appeals' decision will discourage precisely what the patent laws are intended to encourage: innovation, technological development, and investment in high-risk ventures. The Court of Appeals decision will,

unless corrected, increase federal patent litigation by encouraging infringement and spawning numerous and complex disputes over whether particular prior art teachings are applicable to new compounds or compositions of matter under the standards of Section 103.

As stated by Judge Newman, "granting Dillon a patent on her invention takes away nothing that the public already has; and the public receives not only the knowledge of Dillon's discovery, for abandoned patent applications are maintained in secrecy, but Dillon is not deprived of an incentive to discover and to commercialize this new product for her newly discovered use." (Pet.App. 78a)

CONCLUSION

The Court of Appeals' decision is erroneous. Congress has not enacted the standards of obviousness as embodied in 35 U.S.C. §103 and interpreted by this Court in the *Graham* decision that the Court of Appeals has legislated. Injustice has resulted to inventors and will result to patent holders to the long term detriment of the public good.

For the foregoing reasons, this petition for certiorari should be granted. Because the Court of Appeals' decision is so clearly erroneous, summary reversal is appropriate.

Respectfully submitted,

Dated: February 7, 1991

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APPENDIX

APPENDIX

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United States Court of Appeals for the Federal Circuit

88-1245

IN RE DIANE M. DILLON

DECIDED: November 9, 1990

Before NIES, *Chief Judge*, RICH, *Circuit Judge*, COWEN, *Senior Circuit Judge*, MARKEY*, NEWMAN, ARCHER, MAYER, MICHEL, PLAGER, LOURIE, CLEVENGER, and RADER, *Circuit Judges*.

LOURIE, *Circuit Judge*.

Diane M. Dillon, assignor to Union Oil Company of California, appeals the November 25, 1987, decision of the Board of Patent Appeals and Interferences (Board) of the United States Patent and Trademark Office (PTO), Appeal No. 87-0944, rejecting claims 2-14, 16-22, and 24-37, all the remaining claims of patent application Serial No. 671,570 entitled "Hydrocarbon Fuel Composition." We affirm the rejection of all of the claims.[1]

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* Circuit Judge Markey vacated the position of Chief Judge on June 27, 1990.

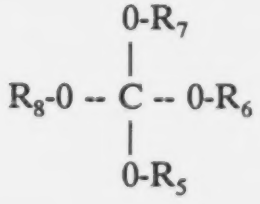
[1] A panel of this court heard this appeal and reversed the Board on December 29, 1989. 892 F.2d 1554, 13 USPQ2d 1337. The PTO petitioned for rehearing and suggested rehearing in banc on February 12, 1990. Rehearing in banc was ordered on May 21, 1990, and the judgment which was entered on December 29, 1989, was vacated, the accompanying opinion being withdrawn.

The Invention

Dillon's patent application describes and claims her discovery that the inclusion of certain tetra-orthoester compounds in hydrocarbon fuel compositions will reduce the emission of solid particulates (*i.e.*, soot) during combustion of the fuel. In this appeal Dillon asserts the patentability of claims to hydrocarbon fuel compositions containing these tetra-orthoesters, and to the method of reducing particulate emissions during combustion by combining these esters with the fuel before combustion.

Claim 2 is the broadest composition claim:

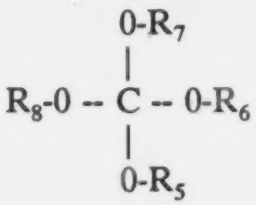
> 2. A composition comprising: a hydrocarbon fuel; and a sufficient amount of at least one orthoester so as to reduce the particulate emissions from the combustion of the hydrocarbon fuel, wherein the orthoester is of the formula:



> wherein R_5, R_6, R_7, and R_8, are the same or different monovalent organic radical comprising 1 to about 20 carbon atoms.

The broadest method claim is claim 24:

24. A method of reducing the particulate emissions from the combustion of a hydrocarbon fuel comprising combusting a mixture of the hydrocarbon fuel and a sufficient amount of at least one orthoester so as to reduce the particulate emissions, wherein the orthoester is of the formula:



wherein R_5, R_6, R_7, and R_8, are the same or different monovalent organic radical comprising 1 to about 20 carbon atoms.

The other claims contain additional limitations and thus are narrower in scope.

The tetra-orthoesters are a known class of chemical compounds. It is undisputed that their combination with hydrocarbon fuel, for any purpose, is not shown in the prior art, and that their use to reduce particulate emissions from combustion of hydrocarbon fuel is not shown or suggested in the prior art.

The Rejection

The Board held all of the claims to be unpatentable on the ground of obviousness, 35 U.S.C. § 103, in view of certain primary and secondary references. As primary references the Board relied on two Sweeney U.S. patents, 4,390,417 ('417) and 4,395,267 ('267). Sweeney '417 describes hydrocarbon fuel compositions containing specified chemical compounds, *viz.*, ketals, acetals, and tri-

orthoesters,[2] used for "dewatering" the fuels, particularly diesel oil. Sweeney '267 describes three-component compositions of hydrocarbon fuels heavier than gasoline, immiscible alcohols, and tri-orthoesters, wherein the tri-orthoesters serve as cosolvents to prevent phase separation between fuel and alcohol. The Board explicitly found that the Sweeney patents do not teach the use of the tetra-orthoesters recited in appellant's claims.

The Board cited Elliott U.S. Patent 3,903,006 and certain other patents, including Howk U.S. Patent 2,840,613, as secondary references. Elliott describes tri-orthoesters and tetra-orthoesters for use as water scavengers in hydraulic (nonhydrocarbon) fluids. The Board stated that the Elliott reference shows equivalence between tetra-orthoesters and tri-orthoesters, and that "it is clear from the combined teachings of these references . . . that [Dillon's tetra-orthoesters] would operate to remove water from non-aqueous liquids by the same mechanism as the orthoesters of Sweeney."

The Board stated that there was a "reasonable expectation" that the tri- and tetra-orthoester fuel compositions would have similar properties, based on "close structural and chemical similarity" between the tri- and tetra-orthoesters and the fact that both the prior art and Dillon use these compounds as "fuel additives." The Commissioner argues on appeal that the claimed composi-

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[2] Tri-orthoesters have three -OR groups bonded to a central carbon atom, and the fourth carbon bond is to hydrogen or a hydrocarbon group (-R); they are represented as $C(R)(OR)_3$. Tetra-orthoesters have four -OR groups bonded to a central carbon atom, and are represented as $C(OR)_4$; see Dillon's claims, *supra*.

tions and method "would have been *prima facie* obvious from combined teachings of the references." On this reasoning, the Board held that unless Dillon showed some unexpected advantage or superiority of her claimed tetra-orthoester fuel compositions as compared with tri-orthoester fuel compositions, Dillon's new compositions as well as her claimed method of reducing particulate emissions are unpatentable for obviousness. It found that no such showing was made.

The Issue

The issue before this court is whether the Board erred in rejecting as obvious under 35 U.S.C. § 103 claims to Dillon's new compositions and to the new method of reducing particulate emissions, when the additives in the new compositions are structurally similar to additives in known compositions, having a different use, but the new method of reducing particulate emissions is neither taught nor suggested by the prior art.

The Broad Composition Claims

Claim 2, the broadest composition claim, comprises a hydrocarbon fuel and an amount of tetra-orthoester sufficient to reduce the particulate emissions from the combustion of the hydrocarbon fuel. The other composition claims contain various limitations including a minimum amount of emission reduction to be achieved (claim 3), percentages of ester in the fuel (claims 4, 5, 16, 20, 21), use of different esters (claims 6-10, 17-19), use of different fuels (claims 11-14, 22), and the requirement that the composition be essentially free of alcohol (claims 36, 37).

The Board stated in its opinion that, to the extent that appellant had not chosen to separately argue the

patentability of the appealed claims, "they stand or fall together," citing *In re Kaslow*, 707 F.2d 1366, 1376, 201 USPQ 67, 70 (CCPA 1979). We agree with the Board except as noted briefly below. It is not the practice of this court to review claims that an applicant has not separately argued at the Board level, because, *inter alia*, we lack the benefit of the Board's reasoned decision on the separate patentability of those claims. *Id.* at 1376, 201 USPQ at 70; *In re Herbert*, 461 F.2d 1390, 1391, 174 USPQ 259, 260 (CCPA 1972). We will therefore review only the merits of the composition claims, as did the Board.

The Board found that the claims to compositions of a hydrocarbon fuel and a tetra-orthoester were *prima facie* obvious over Sweeney '417 and '267 in view of Elliott and Howk. We agree. Appellant argues that none of these references discloses or suggests the new use which she has discovered. That is, of course, true, but the composition claims are not limited to this new use;"*ie.*," they are not physically or structurally distinguishable over the prior art compositions except with respect to the orthoester component. We believe that the PTO has established, through its combination of references, that there is a sufficiently close relationship between the tri-orthoesters and tetra- orthoesters (see the cited Elliott and Howk references) in the fuel oil art to create an expectation that hydrocarbon fuel compositions containing the tetra-esters would have similar properties, including water scavenging, to like compositions containing the tri-esters, and to provide the motivation to make such new compositions. Howk teaches use of both tri- and tetra-orthoesters in a similar type of chemical reaction. Elliott teaches their equivalence for a particular practical use.

Our case law well establishes that such a fact situation gives rise to a *prima facie* case of obviousness.

See In re Shetty, 566 F.2d 81, 85, 195 USPQ 753, 755-56 (CCPA 1977); *In re Albrecht*, 514 F.2d 1385, 1388, 185 USPQ 590, 593 (CCPA 1975); *In re Murch*, 464 F.2d 1051, 1054, 175 USPQ 89, 91 (CCPA 1972); *In re Hoch*, 428 F.2d 1341, 1343, 166 USPQ 406, 409 (CCPA 1970).

Appellant cites *In re Wright*, 848 F.2d 1216, 1219, 6 USPQ2d 1959, 1961 (Fed. Cir. 1988), for the proposition that a *prima facie* case of obviousness requires that the prior art suggest the claimed compositions' properties and the problem the applicant attempts to solve. The earlier panel opinion in this case, *In re Dillon*, 892 F.2d 1554, 13 USPQ2d 1337 (now withdrawn), in fact stated "a *prima facie* case of obviousness is not deemed made unless both (1) the new compound or composition is structurally similar to the reference compound or composition and (2) there is some suggestion or expectation *in the prior art* that the new compound or composition will have the *same or a similar utility as that discovered by the applicant.*" Id. at 1560, 13 USPQ2d at 1341 (emphasis added).

This court, in reconsidering this case *in banc*, reaffirms that structural similarity between claimed and prior art subject matter, proved by combining references or otherwise, where the prior art gives reason or motivation to make the claimed compositions, creates a *prima facie* case of obviousness, and that the burden (and opportunity) then falls on an applicant to rebut that *prima facie* case. Such rebuttal or argument can consist of a comparison of test data showing that the claimed compositions possess unexpectedly improved properties or properties that the prior art does not have (*In re Albrecht*, 514 F.2d 1389, 1396, 185 USPQ 585, 590 (CCPA 1975); *Murch*, 464 F.2d at 1056, 175 USPQ at 92), that the prior art is so deficient that there is no motivation to make what might otherwise appear to be obvious changes (*Albrecht*, 514

F.2d at 1396, 185 USPQ at 590; *In re Stemniski*, 444 F.2d 581, 170 USPQ 343 (CCPA 1971); *In re Ruschig*, 343 F.2d 965, 145 USPQ 274 (CCPA 1965)), or any other argument or presentation of evidence that is pertinent. There is no question that all evidence of the properties of the claimed compositions and the prior art must be considered in determining the ultimate question of patentability, but it is also clear that the discovery that a claimed composition possesses a property not disclosed for the prior art subject matter, does not by itself defeat a *prima facie* case. *Shetty*, 566 F.2d at 86, 195 USPQ at 756. Each situation must be considered on its own facts, but it is not necessary in order to establish a *prima facie* case of obviousness that both a structural similarity between a claimed and prior art compound (or a key component of a composition) be shown and that there be a suggestion in or expectation from *the prior art* that the claimed compound or composition will have the same or a similar utility *as one newly discovered by applicant*. To the extent that *Wright* suggests or holds to the contrary, it is hereby overruled. In particular, the statement that a *prima facie* obviousness rejection is not supported if no reference shows or suggests the newly-discovered properties and results of a claimed structure is not the law.[3]

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[3] The earlier, now-withdrawn Dillon opinion, this opinion, and the dissent cite and rely on cases involving claims to chemical compounds, whereas this case involves compositions. The reason for this reliance is that, in this case, the principal difference between the claimed and prior art compositions is the difference between chemical compounds, *viz.*, tri-orthoesters and tetra-orthoesters. Cases dealing with chemical compounds are therefore directly analogous here and, in view of the history of this case and its *in banc* status, we will make much comment on these cases in this opinion. We do not, however, intend

Under the facts we have here, as described above, we have concluded that a *prima facie* case has been established. The art provided the motivation to make the claimed compositions in the expectation that they would have similar properties. Appellant had the opportunity to rebut the *prima facie* case. She did not present any showing of data to the effect that her compositions had properties not possessed by the prior art compositions or that they possessed them to an unexpectedly greater degree. She attempted to refute the significance of the teachings of the prior art references. She did not succeed and we do not believe the PTO was in error in its decision.

Appellant points out that none of the references relates to the problem she confronted, citing *In re Wright*, and that the combination of references is based on hindsight. It is clear, however, that appellant's claims have to be considered as she has drafted them, *i.e.*, as compositions consisting of a fuel and a tetra-orthoester, and that Sweeney '417 and '267 describe the combination of a liquid fuel with a related compound, a tri-orthoester. While Sweeney does not suggest appellant's use, her composition claims are not limited to that use;[4] the

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to imply that in all cases involving claimed compositions, structural obviousness between involved chemical compounds necessarily makes the claimed compositions *prima facie* obvious.

[4] The dissent misinterprets this comment as indicating that claims to new compounds and compositions must contain a limitation to a specific use, and states that past cases have rejected this proposition. Our comment only points out that the composition claims on appeal are not

claims merely recite compositions analogous to those in the Sweeney patents, and appellant has made no showing overcoming the *prima facie* presumption of similar properties for those analogous compositions. The mention in the appealed claims that the amount of orthoester must be sufficient to reduce particulate emissions is not a distinguishing limitation of the claims, unless that amount is different from the prior art and critical to the use of the claimed composition. *See In re Reni*, 419 F.2d 922, 925, 164 USPQ 245, 247 (CCPA 1970). That is not the case here. The amount of ester recited in the dependent claims can be from 0.05-49%, a very broad range; a preferred range is .05-9%, compared with a percentage in Sweeney '417 approximately equimolar to the amounts of water in the fuel which the ester is intended to remove (.01-5%).

Appellant attacks the Elliott patent as non-analogous art, being in the field of hydraulic fluids rather than fuel combustion. We agree with the PTO that the field of relevant prior art need not be drawn so narrowly. As this court stated in *In re Deminski*, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986) (quoting *In re Wood*, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979)):

> [t]he determination that a reference is from a nonanalogous art is therefore two-fold. First, we decide if the reference is within the field of the inventor's endeavor. If it is not, we proceed to determine whether the reference is reasonably pertinent to the

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structurally or physically distinguishable from the prior art compositions by virtue of the recitation of their newly-discovered use.

> particular problem with which the inventor was involved.

Following that test, one concerned with the field of fuel oils clearly is chargeable with knowledge of Sweeney '417, which discloses fuel compositions with tri-orthoesters for dewatering purposes, and chargeable with knowledge of other references to tri-orthoesters, including for use as dewatering agents for fluids, albeit other fluids. These references are "within the field of the inventor's endeavor." Moreover, the statement of equivalency between tri- and tetra-orthoesters in Elliott is not challenged. We therefore conclude that Elliott is not excludable from consideration as non-analogous art. It is evidence that supports the Board's holding that the prior art makes the claimed compositions obvious, a conclusion that appellant did not overcome.

Appellant urges that the Board erred in not considering the unexpected results produced by her invention and in not considering the claimed invention as a whole. The Board found, on the other hand, that no showing was made of unexpected results for the claimed compositions compared with the compositions of Sweeney. We agree. Clearly, in determining patentability the Board was obligated to consider all the evidence of the properties of the claimed invention as a whole, compared with those of the prior art. However, after the PTO made a showing that the prior art compositions suggested the claimed compositions, the burden was on the applicant to overcome the presumption of obviousness that was created, and that was not done. For example, she produced no evidence that her compositions possessed properties not possessed by the prior art compositions. Nor did she show that the prior art compositions and use were so lacking in significance that there was no motivation for others to make obvious variants. There was no

attempt to argue the relative importance of the claimed compositions compared with the prior art. *See In re May*, 574 F.2d 1082, 1092-95, 197 USPQ 601, 609-11 (CCPA 1978).

Appellant's patent application in fact included data showing that the prior art compositions containing tri-orthoesters had equivalent activity in reducing particulate emissions (she apparently was once claiming such compositions with either tri-orthoesters or tetra-orthoesters). She asserts that the examiner used her own showing of equivalence against her in violation of the rule of *In re Ruff*, 256 F.2d 590, 596, 118 USPQ 340, 346 (CCPA 1958). While we caution against such a practice, it is clear to us that references by the PTO to the comparative data in the patent application were not employed as evidence of equivalence between the tri- and tetra-orthoesters; the PTO was simply pointing out that the applicant did not or apparently could not make a showing of superiority for the claimed tetra-ester compositions over the prior art tri-ester compositions.

Other Claims

As indicated above, the Board held that it would not consider the appealed claims separately, since appellant did not. Nonetheless, appellant, in her brief before the Board, did refer generally to claims directed to fuels essentially free of alcohol (Brief at 32, J. App. at 122), and the Board, in its decision, did respond, stating that no objective evidence was presented to establish any different or unexpected results from limiting the amount of alcohol to less than 1%, *In re Dillon*, No. 87-0944, slip op. at 9-10 (Bd. Pat. App. & Int. Nov. 25, 1987). We agree. Moreover, Sweeney '417 describes compositions which also contain less than 1% alcohol, so there is no real distinction in the claims over the prior art.

Appellant also argued in her brief to the Board that she "must contest" the examiner's position concerning claims limited to no more than 5 or 9 volume percent added orthoester, mentioning claims 16-21 and 27-31. The Board did not expressly deal with these claims, but it is clear to us that, since these limits do not result in an amount of ester different from that disclosed to remove water in Sweeney '417, and no criticality is shown for these limitations, the subject matter of these claims has not been shown to have been nonobvious.

Regarding the method claims, the Commissioner urges affirmance, citing *In re Durden*, 763 F.2d 1406, 226 USPQ 359 (Fed. Cir. 1985), for the proposition that even "substitution of an unobvious starting material into an old process does not necessarily result in an unobvious process." The PTO has, as the Commissioner urges here, applied *Durden* regularly to claims to processes of making and processes of using, on the ground that the type of step involved in the claimed process is not novel.[5]

We make no judgment as to the patentability of claims that Dillon might have made and properly argued to a method directed to the novel aspects of her invention, except to question the lack of logic in a claim to a method of reducing particulate emissions by combusting. Suffice it to say that we do not regard *Durden* as authority to reject as obvious every method claim reading on an old *type of process*, such as mixing, reacting, reducing, etc. The materials used in a claimed process as well as the result obtained therefrom, must be considered along with the

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[5] *See* M. A. Litman, *Obvious Process Rejections Under 35 USC 103*, 71 JPTOS 775 (1989); H. C. Wegner, *Much Ado About Durden*, 71 JPTOS 785 (1989).

specific nature of the process, and the fact that new or old, obvious or nonobvious, materials are used or result from the process are only factors to be considered, rather than conclusive indicators of the obviousness or nonobviousness of a claimed process. When any applicant properly presents and argues suitable method claims, they should be examined in light of all these relevant factors, free from any presumed controlling effect of *Durden*. *Durden* did not hold that all methods involving old process steps are obvious; the court in that case concluded that the particularly claimed process was obvious; it refused to adopt an unvarying rule that the fact that nonobvious starting materials and nonobvious products are involved *ipso facto* makes the process nonobvious. Such an invariant rule always leading to the opposite conclusion is also not the law. Thus, we reject the Commissioner's argument that we affirm the rejection of the method claims under the precedent of *Durden*.

However, appellant did not argue in her brief the separate patentability of her method claims. The statement in her brief to the Board that "the invention 'as a whole' includes the property of the claimed compositions--which property is taken advantage of in the method claims" (Brief at 22, J. App. at 112) is not such a separate argument, since it implies more an added argument for the patentability of the composition claims than an argument that, even if the claimed compositions are found to have been obvious, the claimed methods were nonobvious for particularly stated reasons. Moreover, no such reasons were particularly stated by Dillon. We will therefore not analyze these claims separately and affirm the Board's rejection on that basis.

The Dissent

The strong assertions by the dissent and its treatment of some of the case law impel us to make the following comments:

The dissent argues that our decision is "contrary to the weight and direction of . . . precedent, as embodied in over three decades of decision"; that we are resurrecting the "Hass-Henze" Doctrine, which was "discarded thirty years ago"; and that our holding today "changes what must be proved in order to patent a new chemical compound and composition and its new use, and thus changes what is patentable." We have done none of the above.

What we have done is to decide the case before us on the basis of long-established principles which had provided a stable understanding of the chemical patent law until the issuance of the original panel opinion in this case which we have now vacated. Our intent is to restore the law to its state existing before that panel opinion.

The length of the dissent and the number of cases it discusses may convey the impression that the weight of past jurisprudence is contrary to our holding today. That is not the case. The cited cases are simply not controlling on the facts of the present case or they are not contrary. Many do not deal with the requirements of a *prima facie* case. Some involve process claims, not compound or composition claims. Others are not pertinent for other reasons.

In brief, the cases establish that if an examiner considers that he has found prior art close enough to the claimed invention to give one skilled in the relevant chemical art the motivation to make close relatives (homologs, analogs, isomers, etc.) of the prior art com-

pound(s), then there arises what has been called a presumption of obviousness or a *prima facie* case of obviousness. *In re Henze*, 181 F.2d 196, 85 USPQ 261 (CCPA 1950); *In re Hass*, 141 F.2d 122, 127, 130, 60 USPQ 544, 548, 552 (CCPA 1944). The burden then shifts to the applicant, who then can present arguments and/or data to show that what appears to be obvious, is not in fact that, when the invention is looked at as a whole. *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963). The cases of *Hass* and *Henze* established the rule that, unless an applicant showed that the prior art compound lacked the property or advantage asserted for the claimed compound, the presumption of unpatentability was not overcome.

Exactly what facts constituted a *prima facie* case varied from case to case, but it was not the law that, where an applicant asserted that an invention possessed properties not known to be possessed by the prior art, no *prima facie* case was established unless the reference also showed the novel activity. There are cases, cited in the dissent, in which a *prima facie* case was not established based on lack of structural similarity. *See In re Grabiak*, 769 F.2d 729, 732, 226 USPQ 870, 872 (Fed.Cir. 1985); *In re Taborsky* 502 F.2d 775, 780-81, 183 USPQ 50, 55 (CCPA 1974). Some of the cited cases also contained language suggesting that the fact that the claimed and the prior art compounds possessed the same activity were added factors in the establishment of the *prima facie* case. *E.g., In re Zeidler*, 682 F.2d 961, 966, 215 USPQ 490, 494 (CCPA 1982); *In re Grunwell*, 609 F.2d 486, 491, 203 USPQ 1055, 1058 (CCPA 1979); *In re Payne*, 606 F.2d 303, 314, 203 USPQ 245, 255 (CCPA 1979); *In re Swan Wood*, 582 F.2d 638, 641, 199 USPQ 137, 139 (CCPA 1978); *In re Lamberti*, 545 F.2d 747, 751, 192 USPQ 278, 281 (CCPA 1976); *In re Susi*, 440 F.2d 442, 445, 169

USPQ 423, 426 (CCPA 1971). Those cases did not say, however, as the dissent asserts, that, in the absence of the similarity of activities, there would have been no *prima facie* case.

For example, the dissent quotes a statement in *Grabiak* that "[when chemical compounds have 'very close' structural similarities and similar utilities, without more a *prima facie* case may be made." 769 F.2d at 731, 226 USPQ at 871. That case does not state, as implied by the dissent, that without the similarity of utilities, there would not have been a *prima facie* case. A conclusion based on one set of facts does not necessarily rule out a similar conclusion with slightly different facts. One case cited by the dissent as "rejecting the PTO's interpretation of *Henze* as establishing a 'legal presumption' of obviousness" was *In re Mills*, 281 F.2d 218, 126 USPQ 513 (CCPA 1960). All that case decided, however, was that a one-carbon member of a homologous series is too far from the prior art disclosure of 8 to 12 members to justify the presumption. *Id.* at 223-24, 126 USPQ at 517-18.

We will not review all the cases cited in the dissent, but *Stemniski* is an important case, for it overruled *Henze* and *In re Riden*, 318 F.2d 761, 138 USPQ 112 (CCPA 1963) (a case similar to *Henze)*, "to the extent that [they] are inconsistent with the views expressed herein." 444 F.2d at 587, 170 USPQ at 348. The views that were expressed therein were that:

> [w]here the prior art reference neither discloses nor suggests a utility for certain described compounds, why should it be said that a reference makes obvious to one of ordinary skill in the art an isomer, homolog or analog or related structure, when that

> mythical, but intensely practical, person knows of no "practical" reason to make the reference compounds, much less any structurally related compounds?

Id. at 586, 170 USPQ at 347. Thus, *Stemniski*, rather than destroying the established practice of rejecting closely-related compounds as *prima facie* obvious, qualified it by holding that a presumption is not created when the reference compound is so lacking in any utility that there is no motivation to make close relatives.

Albrecht followed this line of thinking when it held that the prior art compound so irritated the skin that it could not be regarded as useful and therefore did not create a motivation to make related compounds. 514 F.2d at 1392, 1395-96, 185 USPQ at 587, 590.

Properties, therefore, *are* relevant to the creation of a *prima facie* case in the sense of affecting the motivation of a researcher to make compounds closely related to or suggested by a prior art compound, but it is not required, as stated in the dissent, that the prior art disclose or suggest the properties newly-discovered by an applicant in order for there to be a *prima facie* case of obviousness.

The dissent cites the seminal case of *Papesch*, suggesting that it rejected the principle that we now "adopt," thereby implying that we are weakening *Papesch*. We are doing nothing of the sort. *Papesch* indeed stated that a compound and all of its properties are inseparable and must be considered in the determination of obviousness. We heartily agree and intend not to retreat from *Papesch* one inch. *Papesch*, however, did not deal with the requirements for establishing a *prima facie* case, but

whether the examiner had to consider the properties of an invention at all, when there was a presumption of obviousness. 315 F.2d at 391, 137 USPQ at 51. The reference disclosed a lower homolog of the claimed compounds, so it was clear that impliedly a *prima facie* case existed; the question was whether, under those circumstances, the biological data were admissible at all. The court ruled that they were, *id.* at 391, 137 USPQ at 51, and we agree with that result. The dissent quotes the brief passage at the end of the *Papesch* opinion to the effect that the prior art must "at least to a degree" disclose the applicant's desired property, *id.* at 392, 137 USPQ at 52, but this brief mention was not central to the decision in that case and did not refer to the requirements of a *prima facie* case. *Papesch* is irrelevant to the question of the requirements for a *prima facie* case, which is the question we have here.

The dissent refers to a number of cases, including *In re Lunsford*, 357 F.2d 380, 148 USPQ 716 (CCPA 1966), stating that the court had rejected the Patent Office's position of "structures only." That case must be understood in the context of the refusal of the examiner to consider any showing of improved properties, not in the context of a discussion whether a *prima facie* case was created. The compounds were conceded to be sufficiently close to the prior art that, without a showing of a significant difference in properties, they would have been obvious. *Id.* at 381, 148 USPQ at 717.

The dissent asserts that the *Shetty* case "diverg[ed] from the weight of [the court's] precedent" in holding that a *prima facie* case was made based on similarities of structure. The court, in that opinion, accepted the *prima facie* case and concluded that "appellant ha[d] offered no evidence of unobviousness, as by showing an actual difference in properties." 566 F.2d at 86, 195 USPQ at 756

(citing Hoch). The opinion does not suggest that the court was diverging from the weight of precedent.

The dissent mentions positions advanced by the Commissioner, including citing the *In re Mod*, 408 F.2d 1055, 161 USPQ 281 (CCPA 1969) and *In re de Montmollin*, 344 F.2d 976, 145 USPQ 416 (CCPA 1965) decisions. We do not, however, in today's decision necessarily adopt any positions of the Commissioner other than those stated in our opinion and note that neither *Mod* nor *de Montmollin* dealt with the requirements of a *prima facie* case. They concerned the question whether the existence of a new property for claimed compounds in addition to a property common to both the claimed and related prior art compounds rendered the claimed compounds unobvious. We are not faced with that question today.

Other cases, *e.g., In re Gyurik*, 596 F.2d 1012, 1018, 201 USPQ 552, 557-58 (CCPA 1979) ("[n]o common-properties presumption rises from the mere occurrence of a claimed compound at an intermediate point in a conventional reaction yielding a specifically named prior art compound"), have qualified the original rule of the *Hass-Henze* cases, but it is clear that they have not enunciated a rule that, in order to make a *prima facie* case of obviousness, the examiner must show that the prior art suggests a new property discovered by applicant. In not accepting that principle today, as urged in the dissent, we are therefore not retreating from the recent trend of case law development or changing the law.

Another example of the lack of direct pertinence of a case quoted in the dissent is *May*, which the dissent cites as an example of the consistent line of decisions to the effect that "both structure and properties

must be suggested in the prior art before a *prima facie* case of obviousness was deemed made." This case does not state that both structure and properties "must" be suggested. The claimed and prior art compositions were both disclosed as having analgesic activity; it was conceded that a *prima facie* case was made out, but the court concluded that applicants had rebutted the presumed expectation that structurally similar compounds have similar properties with a showing of an actual unexpected difference of properties between the claimed compound and the prior art. 574 F.2d at 1095, 197 USPQ at 611. The applicant in that case thus made a showing that Dillon did not make in this case.

Properties must be considered in the overall evaluation of obviousness, and the lack of any disclosure of useful properties for a prior art compound may indicate a lack of motivation to make related compounds, thereby precluding a *prima facie* case, but it is not correct that similarity of structure and a suggestion of *the activity of an applicant's compounds* in the prior art are necessary before a *prima facie* case is established.

Conclusion

We affirm the Board's decision rejecting claims 2-14, 16-22, and 24-37.

AFFIRMED

United States Court of Appeals for the Federal Circuit

88-1245

IN RE DIANE M. DILLON

ARCHER, *Circuit Judge*, with whom MARKEY and MICHEL, *Circuit Judges*, join, joining-in-part.

I join the majority opinion except to note that the comments on *In re Durden*, 763 F.2d 1406, 226 USPQ 359 (Fed. Cir. 1985), are unnecessary to the decision of this case. The method claims were not rejected by the Board on the basis of that case and, in fact, were not separately considered by the Board. Until a rejection of a method claim based on *Durden* is appealed to this court and the issue fully briefed, it is premature to consider the scope and effect of *Durden*. Accordingly, I do not join this part of the majority opinion.

United States Court of Appeals for the Federal Circuit

88-1245

IN RE DIANE M. DILLON

NEWMAN, *Circuit Judge*, with whom COWEN, *Senior Circuit Judge*, and MAYER, *Circuit Judge*, join, dissenting.

The court today resolves certain disparities in the extensive body of precedent on the question of obviousness of new chemical compounds and compositions. However, these disparities are resolved in a way that is contrary to the weight and direction of this precedent, as embodied in over three decades of decision. The court departs from its considered development of the law governing patentability of new chemical compounds and compositions, and reinstates a rule of "structural obviousness". In so ruling the court not only rejects the weight of precedent, but also errs in the application of 35 U.S.C. §§ 101, 102, and 103.

The majority's holding that *prima facie* obviousness of new chemical compounds and compositions is determined based only on structural similarity to prior art compounds and compositions having a known use[1] is reminiscent of the "Hass-Henze Doctrine" of earlier days. This doctrine was discarded thirty years ago, and although it resurfaced on occasion, its original sweep was superseded by many years of judicial analysis. Review of this analysis shows the courts' evolving understanding of the

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[1] The court allows one exception, as I shall discuss.

characteristics of chemical inventions, particularly the inseparability of chemical properties and chemical structure, and the legal consequences of this scientific fact.

Judicial decisions over the past three decades established the general rule that the determination of *prima facie* obviousness of new chemical compounds and compositions and their uses can not be based on chemical structure alone, but must also include consideration of all their properties, including those discovered by the applicant. This rule had important procedural and substantive consequences during patent examination, for it determined the *kind* of evidence and proof that was required of a patent applicant. The ruling of this *in banc* court changes what must be proved in order to patent a new chemical compound or composition, and thus changes what is patentable.

The body of precedent establishing the burdens of modern patent examination was developed in judicial decisions applying the 1952 Patent Act. As I shall discuss in greater detail, when patent examination showed that the prior art suggested the inventor's new chemical structure and the inventor's newly discovered property and use, a *prima facie* case of obviousness of the new chemical compound or composition and its use was deemed made.

The inventor could, of course, argue that the differences from the prior art were such that a *prima facie* case was not made. And the inventor could rebut the *prima facie* case of obviousness, by showing some unexpected difference in structure or properties and use, not apparent from the teachings of the prior art. Such rebuttal was generally presented in the form of comparative experimental data, whereby the inventor demonstrated that the properties of his or her new chemical compound or

composition achieved some unobvious or unexpected result or advantage, as compared with the actual properties of the prior art structure. This rebuttal often required the inventor to go beyond the general teachings in the prior art, and prove that the prior art compound did not, in fact, possess the specific property and advantage of the new compound or composition. Such proofs were invariably required when the prior art suggested the general property and use discovered by the applicant. Many dozens of decisions of the CCPA and this court illustrate this procedure, and the variety of factual circumstances in which it has been invoked.

In accordance with the court's *in banc* holding,[2] a

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[2] The majority holds that a *prima facie* case of obviousness is made whenever the structure of the applicant's new compound or composition (or mechanical device) is "obvious" from that shown in the prior art, independent of whether the prior art suggests or makes obvious the applicant's newly discovered property and use. The majority allows an exception for situations where the prior art gives no "reason or motivation to make the claimed invention", and duly makes clear that this means motivation to make the new compound or composition for the prior art use, not for the applicant's newly discovered use. This exception comes into play only when the prior art structure has no known utility; and a few such situations are reported, *e.g. In re Stemniski*, 444 F.2d 581, 170 USPQ 343 (CCPA 1971) (prior art compounds used only as intermediates), and *In re Albrecht*, 514 F.2d 1389, 185 USPQ 585 (CCPA 1975) (no practical utility). Thus, according to the majority, when the prior art chemical compound or composition has no known use, the prior art provides no "reason or motivation" to make a structurally similar new compound or composition; and in such case

new chemical compound or composition is not patentable even when the prior art does not suggest that the new chemical compound or composition would have the applicant's newly discovered property and use, unless the applicant makes the same showing that is required when the prior art does suggest the applicant's new property and use.

The applicant is thus required to show "unexpected" properties and results, *whether or not* the prior art provides an expectation or suggestion of the properties and results disclosed in the patent application. And unless the applicant proves that the prior art structure does not actually possess the same unobvious property that the applicant discovered for the new structure, the court holds today that the new chemical compound or composition is not patentable. This is an incorrect application of the patent statute, and a rejection of the wisdom of precedent. Therefore, respectfully, I dissent.

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the prior art would not make a *prima facie* case of obviousness based on structural similarity alone.

While I welcome any reduction in the sweep of the court's holding, this exception is of trivial impact. In most cases the prior art compound or composition has some known use; and thus for most cases the majority's "motivation" test would be met based solely on similarity of structure. This is an important change of law. While the holdings of the prior law were not entirely consistent -- see the various CCPA opinions discussed *post* -- this *in banc* court now establishes the rule that will control all cases in the future.

I

THE LAW

A

The In Banc Issue

Diane M. Dillon appeals the decision of the PTO Board of Patent Appeals and Interferences, which had rejected all of Dillon's claims on the basis that "The claimed subject matter would have been *prima facie* obvious from the combined teachings of the references." The Commissioner, asking the court to choose between divergent decisions of the CCPA, stated the PTO position that *prima facie* obviousness should be based on chemical structure alone:

> [Ilf the prior art suggests an inventor's compound or composition per se, that compound or composition would be *prima facie* obvious, regardless of the properties disclosed in the inventor's application.

Commissioner's brief at 24.

The majority of the *in banc* court adopts the Commissioner's position, expressly rejecting the panel's position that the properties and use discovered by the applicant must be considered in connection with determination of the *prima facie* case under section 103, thereby overruling all prior decisions that so held.[3]

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[3] It is the role of the *in banc* court to resolve "a precedent setting question of exceptional importance", Fed. Cir. R. 35(a), and not simply to second-guess the

I would hold that determination of whether a *prima facie* case of obviousness has been made requires consideration of the similarities and differences as to structure *and* properties and utility, between the applicant's new compounds or compositions and those shown in the prior art. The *Graham* [*v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966)] factors can not be ignored in determination of the *prima facie* case under 35 U.S.C. § 103.[4] As illustrated in precedent, pertinent considerations in determination of whether a *prima facie* case is made include the closeness of the prior art subject matter to the field of the invention, the motivation or suggestion in the prior art to combine the reference teachings, the problem that the inventor was trying to solve, the nature of the inventor's improvement as compared with the prior art, and a variety of other criteria as may arise in a particular case; all with respect to the invention as a whole, and decided from the viewpoint of a person of ordinary skill in the field of the invention.

Of course not all these aspects will loom large in every case, but when present they must be considered. They are as pertinent to determination of the *prima facie* case as they are to the determination that is made after rebuttal evidence is adduced by the applicant. Structure

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panel on the facts of a particular case.

[4] 35 U.S.C. § 103. A patent may not be obtained . . . if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. . . .

alone, without consideration of the applicant's newly discovered properties, is an incomplete focus for consideration of these factors.

B

The Prima Facie Case

The *prima facie* case, as used in patent examination, means not only that the evidence of the prior art reasonably allows the examiner's conclusion of unpatentability, but also that the prior art compels such a conclusion as a matter of law, if the applicant produces no evidence to rebut it. *Black's Law Dictionary*, 1071 (5th Ed. 1979); *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). See the discussion in *In re Mills*, 281 F.2d 218, 222 & n.2, 126 USPQ 513, 516 & n.2 (CCPA 1960), of the "presumption of unpatentability" based on prior art, a judicial usage before the term *"prima facie* case" appeared in CCPA and board decisions.

Patentability is determined, in the first instance, by examination of the patent application in the PTO. The prior art is searched by the patent examiner, who determines whether a *prima facie* case of unpatentability is made based on what was known in the prior art. *Piasecki, supra*. The *prima facie* rejection may be challenged by the applicant on grounds such as that the rejection is insufficiently supported, or incorrect, or based on illogical reasoning; or, if a *prima facie* case is made, evidence may be adduced in rebuttal. *In re Heldt*, 433 F.2d 808, 811, 167 USPQ 676, 678 (CCPA 1970). The *prima facie* case is not "set in concrete", and upon the submission of rebuttal evidence the determination of obviousness *vel non* is made on the entire record. *In re Rinehart*, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

The initial determination by the patent examiner is critical to further proceedings, for the presence or absence of a *prima facie* case of obviousness controls the need for the applicant to adduce rebuttal evidence of unobviousness. The procedure serves to clearly allocate the burdens of going forward and of persuasion as between the examiner and the applicant. *In re Johnson*, 747 F.2d 1456, 1460, 223 USPQ 1260, 1263 (Fed. Cir. 1984). It determines what the applicant must prove, and the kind of evidence the applicant must provide. Thus it determines what is patentable under the statute.

While many judicial decisions turn on the question of adequacy of the rebuttal evidence, the concern of the *in banc* court today is the issue of the *prima facie* case. For when, as here, no rebuttal evidence is presented, determination of the *prima facie* case is decision of the question of patentability.

As illustrated in Dillon's case, the question of whether there is a *prima facie* case of obviousness controls whether Dillon is required to prove that her newly discovered property of particulate (soot) reduction during combustion is not actually possessed by the prior art composition, when the prior art composition was not known or suggested to have this property. Dillon did not so prove, and the Commissioner urges that since Dillon's specification itself discloses that the prior art composition does possess this newly discovered property, the *prima facie* case based on structural similarity was not rebutted.

Heretofore, the courts generally recognized a controlling distinction between the two principal types of factual situations that arise when a patent applicant's new chemical compound or composition has a structure that is "similar" to chemical structures shown in the prior art: (1)

those where the prior art suggests, at least in general terms, that the new chemical compound or composition will have the applicant's newly discovered property and use; and (2) those where it does not. These factual situations have had different consequences with respect to whether a *prima facie* case of obviousness was made. The difference turned on whether or not the structure *and* properties and use of a new chemical compound or composition were suggested in the prior art. The distinction determined whether the applicant was required to come forward with rebuttal evidence, which often was in the form of new technological information not known to the prior art, in order to establish an"unexpected" difference between the properties discovered by the applicant and those actually possessed by the prior art structure.

This distinction brought a consistent application of the law of 35 U.S.C. § 103 to the examination of chemical inventions, for it established the framework wherein the law was applied to the facts of each case. The court today rejects this distinction, holding *in banc* that it suffices to show *prima facie* obviousness whenever the prior art describes a similar chemical structure, provided only that the prior art gives some "reason or motivation" to make the claimed chemical structure, "regardless of the properties disclosed in the inventor's application", in the Commissioner's words. This position is contrary to the weight and direction of precedent, as I shall illustrate, and is contrary to the statutory imperatives of Title 35.[5]

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[5] The majority's insistence that it is merely reinstating the *status quo ante* can not be, of course, for the *in banc* holding that the applicant's newly discovered properties and use are not considered in determining *prima facie* obviousness under section 103 (unless the prior art structure itself has no known use), such that the applicant

C

Precedent

It is critical to an effective patent system that there be consistent law, consistently applied, despite the great diversity of technologies that the patent system must serve. The law that is applied in determining whether a *prima facie* case of obviousness is made, as to new chemical compounds and compositions and their uses, has evolved from analysis of many different factual situations. The large number of decisions on this issue, of this court and the CCPA, produced a rich body of precedent.

The following outline of precedent is chronological, and has its roots in cases decided before enactment of the 1952 Patent Act.

For a while, during an earlier period of modern chemistry, "structural obviousness" alone was deemed to create a presumption of unpatentability. Leading decisions were *In re Hass*, 141 F.2d 122, 127, 130, 60 USPQ 544, 548, 552 (CCPA 1944) and *In re Henze*, 181 F.2d 196, 85 USPQ 261 (CCPA 1950). In these decisions the CCPA held that there was a presumption of obviousness based solely on the close similarity of structure of chemical homologs,[6] regardless of the new property and use that

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must now prove that the prior art structure does not possess the newly discovered property and use, forecloses reliance on contrary precedent.

[6] A homolog is a chemical compound that differs from another compound only by one or more methylene groups. An "adjacent" homolog differs by precisely one

the applicant discovered. Thus a new compound, if a homolog of a known compound, was not patentable unless the applicant overcame this presumption by showing that there was in fact a significant and unexpected difference in the actual properties[7] of the new compound as compared with the actual, albeit unknown to the prior art, properties of the known homolog:

> The burden is on the applicant to rebut that presumption by a showing that the claimed compound *possesses* unobvious or unexpected beneficial properties not actually *possessed* by the prior art homologue.

Henze, 181 F.2d at 201, 85 USPQ at 265 (emphases in original). This difference in properties was required to be shown to exist, whether or not the prior art suggested the property and utility discovered by the inventor for the new compound, and whether or not there was any reason to expect the prior art compound to have that property or utility. The court held:

> It is immaterial that the prior art homologue may not be recognized or *known* to

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methylene group. *Henze*, 181 F.2d at 200, 85 USPQ at 264.

[7] As used in these decisions "property" and "utility" refer to the utilitarian property that complies with 35 U.S.C. § 101, and not to physical or chemical parameters not pertinent to patentability. *In re Kazinski*, 347 F.2d 656, 659, 146 USPQ 25, 28 (CCPA 1965) ("a 'utility' is really a manifestation of a 'property'").

> be useful for the same purposes or to possess the same properties as the claimed compound.

Id, (emphasis in original).

The courts soon expressed dissatisfaction with this rule. See the discussion, and cases cited, in *In re Mills*, 281 F.2d 218, 126 USPQ 513 (CCPA 1960). In *Mills* the CCPA limited the *Henze* presumption to adjacent homologs, and rejected the PTO's interpretation of *Henze* as establishing a "legal presumption" of obviousness. The court held that homology alone does not create an inference of unpatentability or shift the burden of persuasion, but is simply a fact "which must be considered with all other relevant facts before arriving at the conclusion of 'obviousness' specified in 35 U.S.C. § 103." *Id.* at 224, 126 USPQ at 518.

Throughout the 1960's, and thereafter, the CCPA stressed that properties as well as structure were material to the patentability of new chemicals, and *must* be considered. The case of *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963) is often cited for its statement that "a chemical compound and all of its properties are inseparable". *Id.* at 391, 137 USPQ at 51. See *Papesch* for citation of a number of decisions of the CCPA and other courts after *Henze*, illustrating judicial understanding that chemical structure is not severable from chemical (including biochemical) properties in patentability determinations; for it is the properties that determine the utility that is requisite to patentability.

The *Papesch* court rejected the principle that this court now adopts, for in *Papesch* the court held that the

prior art must disclose "at least to a degree" the applicant's desired property and utility. The court said:

> The other factor of importance . . . is that the prior art disclosure was not merely of a structurally similar compound but also, at least to a degree, of *the same desired property* relied on for the patentability of the new compound. Such an "other factor" must of course be considered because it bears on the obviousness of the compound, which is, realistically and legally, a composite of both structure and properties.

Id. at 392, 137 USPQ at 52 (emphasis in original). The majority today disposes of this passage, long the bulwark of chemical practice, as "a brief mention", and "irrelevant" to the *prima facie* case. This passage has been reinforced myriad times after its appearance in *Papesch*, and has been a foundation of the *prima facie* case in examination of chemical patent applications for obviousness in terms of section 103.

Although the CCPA and the Patent Office at the time of *Papesch* did not generally use the terminology "*prima facie* case", the CCPA's holding that a compound is "realistically and legally, a composite of both structure and properties", underlies the requirement that both structure and properties be considered. *Papesch* and its extensive progeny establish that the prior art disclosure should be "at least to a degree, of the same desired property", *id.*, even for a homolog.[8] Absent such disclo-

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[8] Dillon's tetra-orthoester is not a homolog of the tri-orthoester. Nor is it an isomer. The majority opinion simply describes the tri-orthoester and tetra-orthoester

sure, the *presumption* of unpatentability did not arise.[9] This requirement, that both structure and properties be considered, simply continued when the terminology of the *prima facie* case was adopted to describe a legally sufficient case of obviousness under section 103.

In *In re De Lajarte*, 337 F.2d 870, 143 USPQ 256 (CCPA 1964) the same principle was applied to a new composition. The CCPA held that similarity of chemical composition alone did not place on the applicant the obligation of proving that the prior art composition did not possess the applicant's newly discovered property and utility:

> In the total absence of evidence in the record to indicate that the amber glass disclosed by Lyle would be expected to have desirable electrical insulating properties, we can find no justification for placing the burden on applicant to conduct experiments to determine the insulating properties of the colored glass disclosed by Lyle.

Id. at 874, 143 USPQ at 259. As in the modern usage of the *prima facie* case, the court held that the prior art must suggest both similar structure and property before the

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structures as having "a sufficiently close relationship", without the precision of past decisions.

[9] In Dillon's case such disclosure was absent. It is undisputed that Dillon's property of soot-reduction during combustion was not disclosed for the prior art compositions.

burden shifted to the applicant to prove unexpected differences. De Lajarte's claims were to a novel glass composition having insulating properties. The prior art (Lyle) reference showed a glass composition having what the examiner called "very slight differences" in structure, and the properties of amber color and durability. The court said:

> If one were making a colorless glass free of carbon and sulfur, there would be little reason for using the Lyle formula since it was primarily designed to enhance color stability. In the absence of any showing why it would be obvious to modify Lyle's glass, a "103 rejection" must be reversed.

Id. at 875, 143 USPQ at 259.

In *In re Ruschig*, 343 F.2d 965, 145 USPQ 274 (CCPA 1965) the court again observed that the invention "indeed, is a 'conjunction of utility and product', though claimed as new compounds found *to have* the desired biological effect".(Emphasis in original.) The court criticized the PTO position that "the examiner and the board thought the compounds, looked upon as mere chemical formulae, would have been obvious". *Id.* at 973, 145 USPQ at 281. The court stated:

> On the obviousness issue, the vague "basket" disclosure of possible uses in the French and Swedish patents and the equally vague disclosure of the Martin patent are unimportant. What is important is the fact that the utility *discovered by the appellants* is not disclosed in the prior art.

Id. at 977, 145 USPQ at 285 (emphasis in original).[10]

That the utility discovered by the applicant must be at least suggested in the prior art, in order to establish *prima facie* unpatentability of new compounds and compositions that are structurally similar to known chemicals, is the common thread that ties most of the decisions of the CCPA and the Federal Circuit. I do not attempt to include all of the cases that illustrate this point. I do, however, include representative cases of divergent holding, and those that appear to be relied on by the majority.

For example, the Commissioner cites *In re de Montmollin*, 344 F.2d 976, 145 USPQ 416 (CCPA 1965) as supporting authority. In *de Montmollin* the claimed

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[10] In *Ruschig* the court discussed the Commissioner's position that claims to compounds that are structurally similar to known compounds should "define" the newly discovered property on which patentability was based. The CCPA rejected such limitation, stating that "[v]aluable inventions should be given protection of value in the real world of business and the courts". 343 F.2d at 979, 145 USPQ at 286.

The majority of the court today, remarking that "the composition claims are not limited to [Dillon's] new use", hints that the results might be different if they were. *Ruschig* and other cases consistently rejected the proposition that claims to new compounds and compositions *must* contain a limitation to a specific use. Any change in this long-established practice requires careful thought. The majority also holds that Dillon's claim recitation of a "sufficient amount of [orthoester] to reduce the particulate emissions" is ineffective as a use limitation, adding uncertainty to claim draftsmanship.

invention was a new compound, described by the applicant as useful for dyeing wool and cotton. The reference showed structurally similar compounds useful for dyeing wool. The court concluded that the additional ability of de Montmollin's claimed compound to dye cotton was not "sufficient to render the subject matter as a whole unobvious". *Id.* at 979, 145 USPQ at 417-18. This case simply illustrates determination of obviousness by comparing the structures and properties taught in the prior art with those disclosed by the applicant, and bringing judgment to bear on "the subject matter as a whole." *Id.* It does not support the position that a *prima facie* case under section 103 is made on structural similarity, regardless of the applicant's newly discovered property and use.

The principle that both structure and properties must be considered in connection with the *prima facie* case was directly treated in *In re Rosselet*, 347 F.2d 847, 146 USPQ 183 (CCPA 1965), where the court held that "gross similarity" of chemical structure *and* the same area of pharmacological activity constituted a *prima facie* case of obviousness:

> We agree with appellant's admonitions against deciding questions of chemical obviousness on the basis of structure *alone*, whether by means of a "mechanistic overlay" or otherwise. However, we think appellants have failed to present adequate evidence to overcome a *prima facie* showing of obviousness by reason of the admitted "gross structural similarities" of the art compounds, coupled with the fact those compounds are shown to have utility *in the same area of pharmacological activity*.

Id. at 850, 146 USPQ at 185 (emphases in original).

Other decisions during this period illustrate varying judicial emphases, depending on the facts. When the compounds were quite closely related in chemical structure, as in the homologs and analogs of *In re Riden*, 318 F.2d 761, 138 USPQ 112 (CCPA 1963), or the position isomers of *In re Mehta*, 347 F.2d 859, 146 USPQ 284 (CCPA 1965), the court gave greater evidentiary weight to the structural similarities than when the structures were less directly comparable. However, the court regularly admonished that:

> A compound is not, however, merely a structural formula; its properties as part of the whole must be considered.

Id. at 864, 146 USPQ at 287.

In *In re Lunsford*, 357 F.2d 380, 148 USPQ 716 (CCPA 1966) the court listed eight recent decisions in which it had rejected the Patent Office's position of "comparison of structures only":

> Just how one finds the compounds "obvious" in the first instance, the examiner does not say, but apparently he envisions a comparison of structures *only*. That such an approach is not sanctioned by this court, although concededly the law was less well defined in June 1961, the date of the Examiner's Answer, can be seen, e.g., in *In re Krazinski*, 347 F.2d 656, 146 USPQ 25 [(CCPA 1965)]; *In re Ruschig*, 343 F.2d 965, 145 USPQ 274 [(CCPA 1965)]; *In re Ward*, 329 F.2d 1021, 141 USPQ 227 [(CCPA

> 1964)]; *In re Lunsford*, 327 F.2d 526, 140 USPQ 425 {(CCPA 1964)]; *In re Riden, Jr.*, 318 F.2d 761, 138 USPQ 112 [(CCPA 1963)]; *In re Papesch*, 315 F.2d 381, 137 USPQ 43 [(CCPA 1963)]; *In re Peterinq*, 301 F.2d 676, 133 USPQ 275 [(CCPA 1962)]; *In re Lambooy*, 300 F.2d 950, 133 USPQ 270 [(CCPA 1962)].

Id. at 382 n.2, 148 USPQ at 718 n.2 (emphasis in original). The court reiterated:

> [Tlhe discovered activities or properties are *part of* the things claimed, the compounds. . . . [Wle, like the Patent Office, are required by the clear wording of section 103 to regard it as a relevant portion of the invention "as a whole."

Id. at 384, 148 USPQ at 720 (emphasis in original).

In a companion case, *In re Lunsford*, 357 F.2d 385, 148 USPQ 721 (CCPA 1966), the court again stressed that determination of obviousness must be based on both structure and properties. The court quoted the Patent Office position, in the examiner's words:

> The argument that the "subject matter as a whole" under 35 U.S.C. 103 includes the compound and its utility is considered to be without merit.

Id. at 391, 148 USPQ at 725. The court once more firmly rejected
that position:

> [It is reasonably clear that the examiner considered only the difference in *structures* between the claimed compounds and the prior art compounds.
>
> Appellant was entitled to have differences between the claimed invention, *the subject matter as a whole*, and the prior art references of record evaluated.

Id. (emphases in original). Referring to 35 U.S.C. § 103, the court wrote:

> It is not believed that [a person of ordinary skill in the art] would consider only the *structures* of the compounds[.]

Id. (emphasis in original).

These judicial analyses, written before the terminology of the *prima facie* case became routine in patent examination, nonetheless placed the burden on the examiner to come forward with prior art sufficient to support any purported suggestion of the applicant's properties:

> Moreover, as a matter of law under 35 U.S.C. 103, the examiner must substantiate his "suspicions" on the basis of facts drawn from proper prior art. The issue to be resolved requires more than "suspicions;" it requires *facts*.

Id. (footnote omitted, emphasis in original).

The CCPA put "structural obviousness" in perspective when, again receiving this argument from the Com-

missioner, the court commented on the large numbers of yet-unmade compounds that would be "structurally obvious" to a chemist:

> The solicitor has reargued in his brief the question of the obviousness of chlorpropamide to a chemist as a compound, that is, what we sometimes refer to as its "structural obviousness." This is not a matter of dispute. We think appellant would concede that all 1,237,464 compounds he claims to be within the Ruschig et al. disclosure or the 38,556 compounds he claims to be within the broadest patent claim, are structurally obvious.

In re McLamore, 379 F.2d 985, 989, 154 USPQ 114, 117 (CCPA 1967). Indeed, few of today's new chemicals have such imaginative structure that structurally similar compounds are not to be found in the prior art.[11] Nonetheless, the reasoning rejected in *McLamore* appeared two years later in the CCPA decision *In re Mod*.

In re Mod, 408 F.2d 1055, 161 USPQ 281 (CCPA 1969) was described by the Commissioner as "on all fours"

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[11] In 1980 the Supreme Court noted that over 4,848,000 compounds had been listed by the Chemical Abstracts Service. *Dawson Chemical Co. v. Rohm & Haas Co.*, 448 U.S. 176, 221 n.23, 206 USPQ 385, 407 n.23 (1980). In 1990 the ten millionth specific compound had been entered in the register. *Chemical & Engineering News*, February 26, 1990, p. 30. This count is of characterized compounds, and does not include theoretical permutations and combinations such as those calculated in *McLamore*.

with Dillon's facts. Mod's new compounds were adjacent homologs and isomers of known compounds that were described in the prior art as insecticides. Mod's compounds had "antimicrobial activity against a variety of micro-organisms such as bacteria, yeast, and molds". *Id.* at 1055, 161 USPQ at 282. The court held Mod's compounds unpatentable for obviousness, referring to the close similarities of structure and remarking that Mod "did not deny" that his new compounds had insecticidal activity. The court in *Mod* did not discuss a *"prima facie* case", but stated that it was not sufficient for patentability that the antimicrobial activity of Mod's new compounds was unknown to the prior art. *Id.* at 1057, 161 USPQ at 283. In a decision analogous to the majority's holding today, the CCPA held that because Mod's new compounds would have been obvious for the prior art use as insecticides, they were unpatentable despite Mod's discovery of a "significant" new property. *Id.*

Mod has often been distinguished. See, e.g., *In re Albrecht*, 514 F.2d 1389, 185 USPQ 585 (CCPA 1975), wherein the court directly contradicted *Mod*, as follows:

> We are of the opinion that a novel chemical compound can be *nonobvious* to one having ordinary skill in the art notwithstanding that it may possess a known property in common with a known structurally similar compound.

Id. at 1395-96, 185 USPQ at 590 (emphasis in original). With rare exceptions *Mod* has not been followed; until today.[12]

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[12] The facts in *Mod* are indeed on all fours with the facts now before us. In *Mod* the court held that the apparently shared property of insecticidal activity sufficed

Continuing the chronological review: In *In re Jones*, 412 F.2d 241, 162 USPQ 224 (CCPA 1969) the court upheld the rejection of composition claims to a blend of polypropylene and an asbestos filler as *prima facie* obvious, for the reason that "the prior art suggests the combination generally for the primary purpose (*i.e.*, improved structural rigidity) for which it was made." *Id.* at 244, 162 USPQ at 226. Comparative data were properly required, for both structure and properties were suggested in the prior art.

The procedural and substantive rigor of the *prima facie* case in patent examination is again illustrated in *In re Godron*, 428 F.2d 854, 166 USPQ 327 (CCPA 1970), wherein the court held that since a *prima facie* case of obviousness was not made as to a new glass composition having new and unobvious properties, it was unnecessary for the applicant to prove whether the prior art composi-

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to make Mod's new (but structurally similar) compounds unpatentable for obviousness, despite Mod's discovery that his new compounds had the new property of antimicrobial activity. In Dillon's case the court holds that the presumptively shared property of water sequestration suffices to make Dillon's new (but structurally similar) compositions unpatentable for obviousness, despite Dillon's discovery that her new compositions have the new property of soot reduction. In neither case did the prior art suggest or make obvious the applicant's newly discovered property. The absence of the term "*prima facie* case" from the *Mod* opinion does not distinguish it from the majority's holding today. A conclusion of obviousness must be legally sufficient under the statute, and for both Mod and Dillon the courts hold that on similar facts this conclusion is compelled as a matter of law.

tion had the same property (the ability to wet graphite) as the applicant's composition:

> We agree that it is improper to require comparative evidence where a reference is devoid of any suggestion of the claimed invention.

Id. at 855, 166 USPQ at 329.

This procedure was similarly applied to chemical process claims. For example, in *In re Freed*, 425 F.2d 785, 165 USPQ 570 (CCPA 1970) the claimed invention was a single-step process for producing calcium pantothenate. The CCPA held that the examiner had failed to support a *prima facie* case, since the prior art disclosed only a two-step process. Since a *prima facie* case was not made, the court held that it was unnecessary to show unexpected results. *Id.* at 788 & n.5, 165 USPQ at 572 & n.5. *See also, e.g., In re Alul*, 468 F.2d 939, 943, 175 USPQ 700, 703-04 (CCPA 1972) (since *prima facie* case not established, no need to consider contentions of unobvious results).

In *In re Kuderna*, 426 F.2d 385, 165 USPQ 575 (CCPA 1970) the board held that a claimed carbamate compound, having utility as an insecticide, was *prima facie* obvious in view of structurally similar known carbamates described in the prior art as useful as insecticides. The court held that the applicant's showing of superior results demonstrated unobviousness, in view of the entirety of the relevant teachings of the prior art and the absence of anything "on which to base a prediction of the comparative insecticidal activities" of these carbamate compounds. *Id.* at 390, 165 USPQ at 579.

In *In re Hoch*, 428 F.2d 1341, 166 USPQ 406 (CCPA 1970) the reference described a known compound and its use for "treatment of plant diseases"; the court held that a *prima facie* case of obviousness was made as to the applicant's structurally similar compound disclosed to be useful as a herbicide, stating:

> On the face of it, "treatment of plant diseases" could mean usefulness in controlling plant-infesting organisms . . . . We are thus not persuaded that herbicidal properties are "contraindicated" by the [prior art] patent.

Id. at 1343, 166 USPQ at 408-09. *Hoch* simply illustrates the court's consideration of the closeness of the chemical structures (the only difference was between an acid and its ethyl ester) *and* the court's stated uncertainty about the relationship of the properties shown in the prior art and those disclosed by the applicant, in deciding whether a *prima facie* case was made.

The classical reasoning of the *prima facie* case is again illustrated for composition claims in *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971). A composition comprising a polymer and a stabilizer was held *prima facie* obvious because a similar combination was suggested in the prior art for the same purpose, and Susi's stabilizer compounds were similar in structure to known compounds having the known property of stabilizing similar polymers. *Id.* at 444, 169 USPQ at 425. Thus a showing of unobvious results was properly required, for both structure and

properties of the new composition were suggested in the prior art.[13]

Another routine illustration of the *prima facie* case based on similarity of both structure and properties, between the prior art and the claimed compound, is seen in *In re Ackermann*, 444 F.2d 1172, 170 USPQ 340 (CCPA 1971). The board had rejected claims to an optical brightening agent as *prima facie* obvious from references describing structurally similar compounds having pronounced fluorescence and optical brightening properties. The CCPA agreed that a *prima facie* case had been made, since the "references also suggest that the art would expect the class of compounds as a whole to possess the general property of optical fluorescence"; but the court reversed on the question of sufficiency of the rebuttal evidence. *Id.* at 1176, 170 USPQ at 342-43.

In *In re Stemniski*, 444 F.2d 581, 170 USPQ 343 (CCPA 1971) the court again held that similarity of structure alone was insufficient for *prima facie* unpatentability. The claimed new compounds were analogs of known diaryl-tin compounds, and the known

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[13] There is extensive precedent relating to chemical compositions as well as chemical compounds; see the sampling herein. The statement by the majority that its *in banc* holding does not "necessarily" apply to "all cases" of chemical compositions will not add clarity and stability to the law. The court's holding today must be followed by patent examiners and patent applicants, and while I dissent from it, it is essential that inventors and examiners, producing and processing 150,000 new patent applications annually, know the law and practice that will control patentability.

compounds were described as having no established utility, although utilities were suggested by the court. The court observed that the prior art provided no motivation to make the claimed compounds for applicant's purpose, although "one of ordinary skill would suppose the properties or potential uses of the two groups of compounds would be similar." *Id.* at 585, 170 USPQ at 347.[14]

The *Stemniski* court remarked on "this court's failure to render consistent precedent" on the issue of structural obviousness, *id.* at 585, 170 USPQ at 347, stating that

> *Henze*, its predecessors and its progeny have met with their share of criticism over the years, both in this court, in other courts, and elsewhere.

Id. at 587, 170 USPQ at 348 (footnote omitted). The court confronted the Commissioner's argument on the sufficiency of structural similarity alone, and held:

> To the extent that *Henze* and *Riden* are inconsistent with the views expressed here-

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[14] As pointed out at n.2,*supra*, the facts illustrated in *Stemniski*, where the prior art compounds assertedly had no known use, are the only circumstance wherein the majority allows that structural similarities alone do not make a *prima facie* case of obviousness under section 103. While a chemical compound may be of solely theoretical interest, it is hard to imagine a composition (or a mechanical device) with no known use; thus this exception has scant practical significance with respect to compositions and mechanical devices.

> in, they no longer will be followed, and are overruled.

Id. at 587, 170 USPQ at 348.

In *In re Murch*, 464 F.2d 1051, 175 USPQ 89 (CCPA 1972) the claims were directed to new polymer compositions described as having certain properties of toughness. A *prima facie* case was deemed made based on similar properties of toughness described for similar polymer compositions in the prior art; and was held rebutted based on evidence of improved weld line toughness. *Id.* at 1056, 175 USPQ at 92. Although the majority today cites *Murch* as supporting authority for "structural obviousness", the court in *Murch* distinguished *Mod* and *de Montmollin*, and reaffirmed reliance on *Papesch*. *Murch* is remote from a holding of *prima facie* obviousness based on structural similarity alone.

In *In re Freeman*, 474 F.2d 1318, 177 USPQ 139 (CCPA 1973) the court again distinguished *Mod* and *de Montmollin*, which had again been cited by the Commissioner for the position that structural similarity alone suffices to support a *prima facie* case of obviousness. The court stated:

> We have recently pointed out that the rule derived from *Mod* and *de Montmollin* by the Patent Office is not supported by those cases.

Id. at 1322, 177 USPQ at 142. The court discussed the principle of the *prima facie* case as applied to section 103, explaining that if the evidence of obviousness of the claimed subject matter

> is strong enough to establish a *prima facie* case, i.e., one which would prevail in the absence of rebuttal evidence, we must go on to examine the evidence of nonobviousness before the legal conclusion called for by section 103 can be reached.

Id. The court stressed the need to consider all the evidence.

The claimed invention in *In re Mochel*, 470 F.2d 638, 176 USPQ 194 (CCPA 1972) was sodium glass compositions containing magnesium oxide, a component known for use in lithium glass compositions. The court held:

> No suggestion appears in the record of a purpose for including MgO in sodium glasses and no teaching of identical effects of secondary components in sodium and lithium glasses. We do not consider it "fair to assume" [quoting the examiner] such identity. We cannot, therefore, sustain the finding of *prima facie* obviousness.

Id. at 641, 176 USPQ at 196.

In *In re Cescon*, 474 F.2d 1331, 177 USPQ 264 (CCPA 1973) the court reversed the rejection of compound claims, where the board had relied on known methods of making the compounds as evidence of obviousness, and the examiner had "totally disregarded" the showings of improved properties. The court stated:

> It has long been our position that a compound and its properties are inseparable and that no property

> can be ignored in determining patentability over the prior art.

Id. at 1334, 177 USPQ at 266. The court found that the prior art did not suggest a relationship between the change in chemical structure and the applicant's phototropic properties. The court stated that it was insufficient that this type of chemical modification was known:

> Nothing in the prior art suggests any relationship between ortho substitution in the 2-phenyl ring [the structural difference from the prior art] and the properties disclosed and illustrated in appellant's specification.

Id. at 1334, 177 USPQ at 266-67. The court quoted with approval the following statement from *In re Larsen*, 292 F.2d 531, 533, 130 USPQ 209, 210 (CCPA 1961), *cert. denied*, 370 U.S. 936 (1962):

> Since there was nothing to indicate that the compounds, when made, would have these properties, it was not obvious to make the compounds. In such a case the allowance of claims to the compounds must depend on the proposition that it was unobvious to conceive the idea of producing them, within the meaning of Title 35 U.S.C., Section 103.

Cescon, 474 F.2d at 1334, 177 USPQ at 266.

These cases illustrate the CCPA's continuing rejection of the "structural obviousness" theme, on the rationale that unless there was a reason or motivation shown in the prior art to make the particular structural change that the applicant made, in order to achieve the properties that the applicant was seeking, "it was not obvious to

make the compounds." *Id.* As the court explained, the "idea" of new compounds is not separable from the properties that were sought by the inventor when making the compounds. Structure and properties are essential components of "the invention as a whole", in the words of section 103.

In *In re Taborsky*, 502 F.2d 775, 183 USPQ 50 (CCPA 1974) the prior art described a large number of isomers and analogs of the applicant's compounds. Taborsky's products were "halogen" compounds, discovered to be useful as selective piscicides against brown bullhead fish and as larvicides to control sea lampreys. The prior art compounds were described as controlling gastropods and snails. The *Taborsky* decision illustrates the care with which the court compared, compound by compound, the applicant's and the prior art's disclosure of structures *and* properties. As to the applicant's chlorine, bromine, and iodine analogs, the court remarked that it was unnecessary to pass on the issue of whether a *prima facie* case were made by the prior art's disclosure of related compounds containing these three halogens, because such case, if made, had been overcome by evidence of the comparative effectiveness of these compounds as larvicides to control sea lampreys. *Id.* at 781, 183 USPQ at 55. As to the fluorine analogs, the *Taborsky* court held that the board's holding of *prima facie* obviousness "because of structural similarity to the cited prior art" could not stand, since there was "no motivation to make the proposed molecular modifications needed to arrive at appellant's claimed fluoro-substituted compounds." *Id.* at 780-81, 183 USPQ at 55. The court held that it was not necessary for the applicant to compare actual properties of the new and the prior art compounds:

> Since we hold that the prior art of record fails to establish that the fluoro-substituted compounds recited in appellant's claims are *prima facie* obvious, it is unnecessary to consider any comparative evidence with respect to the properties of these compounds.

Id. at 781, 183 USPQ at 55.

Only when the *prima facie* case was established by the prior art was the applicant required to develop comparative evidence. It is as much an obligation to avoid imposing unnecessary burdens on the applicant, and on the Patent Office, as it is to assure compliance with the law. *See, e.g., In re Seigneurin*, 474 F.2d 1020, 1023, 177 USPQ 257, 259 (CCPA 1973) (since no *prima facie* case of obviousness was made for a catalyst component of a chemical process, "[tlhat concludes the matter"); *In re Fischer*, 484 F.2d 961, 963-64, 179 USPQ 304, 306 (CCPA 1973) (no *prima facie* case, therefore no need to show unexpected results of claimed method). While the CCPA did not always decline to consider such evidence when it was already of record, the principle underlying orderly patent examination is that the burden in the first instance is on the examiner to establish that the claimed invention is *prima facie* unpatentable based on the prior art.

The no-utility exception that is recognized in the majority opinion is seen in the following case. In *In re Albrecht*, 514 F.2d 1389, 185 USPQ 585 (CCPA 1975) (*Albrecht* I) the prior art compounds were described as anesthetics that had the disadvantage of being skin irritants and therefore were not of practical use.
Albrecht's new compounds were antiviral agents. The

claims were rejected as *prima facie* obvious based on similarity of structure; in the examiner's words:

> Where such closely structurally related compounds are concerned, actual unexpected *differences* in properties are required to overcome a prima facie case of obviousness. Even though the present compounds may exhibit an unexpected property as anti-virals, they are obvious as anesthetics.

Id. at 1392, 185 USPQ at 587 (emphasis in original). The Commissioner argued that Albrecht must prove that his new compounds were not anesthetics. The court disagreed, holding that the properties shown in the prior art did not provide the "necessary impetus" to make Albrecht's compounds, *id.* at 1396, 185 USPQ at 590. The court also reaffirmed that properties must always be considered:

> This court has several times recently expressed its position on the role of the properties of chemical compounds in assessing their obviousness under § 103. See In re Taborsky, 502 F.2d 775, 183 USPQ 50 (CCPA 1974); In re Blondel, 499 F.2d 1311, 182 USPQ 294 (CCPA 1974); see further In re Murch, 464 F.2d 1051, 175 USPQ 89 (CCPA 1972); In re Lintner, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972).

Id. at 1394, 185 USPQ at 588-89. The court observed that Albrecht's newly discovered antiviral property is "totally dissimilar" to the properties disclosed for the prior art compounds, and is "not to be ignored":

> A newly discovered activity of a claimed novel compound which bears no material relationship to the activity disclosed for the prior art analogs is further evidence, not to be ignored, of the nonobviousness of the claimed invention.

Id. at 1396, 185 USPQ at 590. The court reversed the rejection.

In *In re Albrecht*, 514 F.2d 1385, 185 USPQ 590 (CCPA 1975), decided the same day, the court held, as to other related compounds, that a *prima facie* case was made based on structural similarity to the compounds of the same prior art reference as in *Albrecht* I. The court disposed of the Commissioner's position that the applicant should have provided comparative data with the anesthetic property of the prior art compounds, as follows:

> There seems to be little doubt that the Patent and Trademark Office would not have entertained such a comparison if initiated by appellants because they have no support in their specification for use of the claimed compounds as anesthetics. See In re Davies, 475 F.2d 667, 177 USPQ 381 (CCPA 1973).

Id. at 1389, 185 USPQ at 593. The court correctly observed that comparative data, when required to rebut a *prima facie* case, should relate to the new property and use discovered by the applicant, not an unrelated known use of the prior art products.

In *In re Lamberti*, 545 F.2d 747, 192 USPQ 278 (CCPA 1976) certain new compounds having germicidal

activity were rejected as *prima facie* obvious over structurally similar compounds described as biological toxicants, a use that the court found may include germicidal activity, although not necessarily. *Id.* at 750, 192 USPQ at 280. Rebuttal evidence was adduced and found insufficient. The court concluded:

> In view of the foregoing, and considering the claimed invention as a whole vis-a-vis the evidence produced by the PTO, which shows both a close structural similarity between the prior art compounds and the claimed compounds and a close similarity between the *disclosed* uses, we hold that appellants' invention would have been obvious to one of ordinary skill in the pertinent art.

Id. at 751, 192 USPQ at 281 (emphasis added).

The majority has cited *In re Shetty*, 566 F.2d 81, 195 USPQ 753 (CCPA 1977). Shetty's new compounds were homologs of known compounds that were described in the prior art as antiviral agents, whereas Shetty's compounds were discovered to have appetite-suppressant activity. Diverging from the weight of its precedent, the court held that a *prima facie* case was made based on the close similarities of chemical structure. Since Shetty did not prove that there were actual differences in properties, the composition claims were not allowed.

However, the *Shetty* court allowed the process claims (to the new use),[15] without requiring such proof. The court said, following precedent:

> The Patent Office has failed to show a reasonable expectation, or some predictability, that [a reference] compound would be an effective appetite suppressant if administered in the dosage disclosed by [another reference].

Id. at 86, 195 USPQ at 756. In contrast, the majority today affirms the rejection of Dillon's claims, process and composition, although such "expectation" or "predictability" was, without dispute, absent.

Despite the occasional aberration illustrated by *Shetty*, the CCPA decisions became remarkably consistent in requiring that both structure and properties must be suggested in the prior art before a *prima facie* case of obviousness was deemed made, whether for composition claims or process claims. *E.g., In re May*, 574 F.2d 1082, 197 USPQ 601 (CCPA 1978), wherein the prior art compounds were isomers of May's compounds, and showed the same analgesic activity. A *prima facie* case was conceded as to the composition and the process claims, and overcome by rebuttal evidence of the non-addictiveness of May's compounds, an attribute that was shown to be unpredictable.

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[15] A new use is claimed as a process, in accordance with 35 U.S.C. § lOO(b):

> The term "process" means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.

Similar reasoning was applied to claims to a new use of a known compound in, *e.g.*, *In re Herschler*, 591 F.2d 693, 200 USPQ 711 (CCPA 1979), wherein the use of the known compound DMSO (dimethyl sulfoxide) to enhance steroid penetration through skin tissue was held by the board to be *prima facie* obvious from references showing DMSO in hair lotion preparations that may contain estrogenic hormones (steroids). The court reversed, holding that "[tlhe references do not provide any impetus to do what appellant has done". *Id.* at 702, 200 USPQ at 718-19. In the absence of a *prima facie* case, appellant's rebuttal evidence was unnecessary:

> We do not find it necessary to reach the question of the weight to be given the papers presented to the New York Academy of Sciences in that appellant has no *prima facie* showing of obviousness to rebut.

Id. at 702 n.9, 200 USPQ at 719 n.9.

Over the remaining years of the CCPA's existence its opinions were steadfast in requiring consideration of both structure and properties in determinations of *prima facie* obviousness. Precedent had ripened, as exceptions diminished. See *Kotteakos v. United States*, 328 U.S. 750 (1946), wherein the Supreme Court discusses how case by case determination on a variety of facts in time shows the direction of the law:

> For, as with all lines which must be drawn between positive and negative fields of law, the precise border may be indistinct, but case by case determination of particular points adds up in time to discernible direction.

328 U.S.at 761-62.

Further illustrations of the direction established by precedent are, *e.g., In re Swan Wood*, 582 F.2d 638, 641, 199 USPQ 137, 139 (CCPA 1978):

> In view of the close structural similarity between the claimed compounds and [the prior art compound], and the fact that the latter is disclosed as possessing antimicrobial activity, we believe that one skilled in the art would have been, *prima facie*, motivated to make the claimed compounds in the expectation that they, too, would possess antimicrobial activity.

In *In re Payne*, 606 F.2d 303, 203 USPQ 245 (CCPA 1979), the court stated:

> The similarity in structure and properties between the prior art and claimed compounds is sufficiently close to support a *prima facie* case of obviousness.

Id. at 314, 203 USPQ at 255. The court explained:

> An obviousness rejection based on similarity in chemical structure and function entails the motivation of one skilled in the art to make a claimed compound in the expectation that compounds similar in structure will have similar properties.

Id. at 313, 203 USPQ at 254.

In *In re Grunwell*, 609 F.2d 486, 203 USPQ 1055 (CCPA 1979) the court held that a *prima facie* case of obviousness was made for certain new steroids, and not for others. For compounds where the structures differed from the prior art only in a methyl substituent, and the physiologic and psychologic properties were similar, a *prima facie* case was deemed made. *Id.* at 491, 203 USPQ at 1059. Other Grunwell steroids were ethers, while the closest structures in the prior art were alcohols; in that case the court held that a *prima facie* case was not made, because the examiner had not shown why one skilled in the art would have replaced this hydroxyl group with an ether. *Id.*

Similar reasoning was applied to process claims in *In re Clemens*, 622 F.2d 1029, 206 USPQ 289 (CCPA 1980). Claims to the use of new polymeric exchange resins to remove corrosion products in a steam system were rejected as *prima facie* obvious from references describing structurally similar polymers used for the same purpose. However, the court found that the PTO did not make a *prima facie* case as to claim 8 because of temperature limitations not shown in the prior art. Therefore:

> Since the PTO had not made out a prima facie case of obviousness respecting claim 8, evidence of comparative testing was unnecessary in rebuttal.

Id. at 1036, 206 USPQ at 296.

Again in *In re Zeidler*, 682 F.2d 961, 215 USPQ 490 (CCPA 1982) a *prima facie* case was deemed made based on similarity of structure and of properties:

> One of ordinary skill would have had reason to expect, given the close structural similarity of the [reference] compounds and the teachings of [another reference], that use of a sulfonamide bridge . . . would have resulted in dyes possessing the same or only slightly different properties from prior art dyes.

Id. at 966, 215 USPQ at 494. The *prima facie* case was held rebutted as to one claimed dye compound, but not as to another. *Id.*

The Federal Circuit did not stray from this precedent.[16] As summarized in *In re Grabiak*, 769 F.2d 729, 731, 226 USPQ 870, 871 (Fed. Cir. 1985):

> When chemical compounds have "very close" structural similarities and similar utilities, without more a *prima facie* case may be made.

The rule also continued to be applied to process (use) claims, as illustrated in *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986), wherein the court held

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[16] Although the majority states that it is "not retreating from the recent trend of case law", the cases over the past thirteen years (since *Shetty*) do not support this view. The courts have generally required that there be a suggestion in the prior art that would have made obvious not only the chemical structure but also the newly discovered property of a new chemical compound or composition, in order to make a *prima facie* case under section 103.

that "close structural similarity and a similar use" of the applicant's known compound and the prior art compound made a *prima facie* case of obviousness of claims to the asserted new use. *Id.* at 1097, 231 USPQ at 379.

In *In re Geiger*, 815 F.2d 686, 2 USPQ2d 1276 (Fed. Cir. 1987) the Federal Circuit held that although the prior art disclosed the separate components of the claimed new compositions, for the same general use of treating cooling water systems, a *prima facie* case was not established "absent some teaching, suggestion or incentive supporting the combination". The court held that:

> Because we reverse on the basis of failure to establish a *prima facie* case of obviousness, we need not reach the issue of the sufficiency of the showing of unexpected results.

Id. at 688, 2 USPQ2d at 1278.

In *In re Chupp*, 816 F.2d 643, 2 USPQ2d 1437 (Fed. Cir. 1987) the applicant did not challenge the board's holding that a new compound useful as a herbicide was *prima facie* obvious in view of the prior art showing of an adjacent homolog and other structurally similar compounds used as herbicides. However, the court found the rebuttal evidence of differences in selectivity sufficient to hold the composition claims allowable. *Id.* at 647, 2 USPQ2d at 1440.

In *Chupp* the court disposed of the Commissioner's policy argument that grant of the composition claims would prevent the public from using Chupp's structurally obvious compound for the herbicidal uses shown in the prior art, with the remark that "the expectation that

persons would want to use the compound to produce inferior results (or would want to fight lawsuits over such uses) is false." *Id.* at 647, 2 USPQ2d at 1440.

The Federal Circuit has not applied the standard of *prima facie* obviousness that the majority today "reaffirms", but has consistently considered properties and use as well as structure. The only decision referred to by the majority is *In re Wright*, 848 F.2d 1216, 6 USPQ2d 1959 (Fed. Cir. 1988), as if *Wright* stood alone in its requirement that the inventor's desired properties and use must be considered. *Wright* dealt with a mechanical device, and is in the mainstream of this precedent. In *Wright* we said:

> The determination of whether a novel structure is or is not "obvious" requires cognizance of the properties of that structure and the problem which it solves, viewed in light of the teachings of the prior art.

Id. at 1219, 6 USPQ2d at 1361 (citations omitted). Not one of the myriad cases wherein the courts had required consideration of these factors is mentioned or distinguished by the majority, although presumably *all* are now overruled. In this already-lengthy survey I have not included mechanical cases whose rationale is stated in the same terms as that of *Wright*.[17] Nonetheless the *in banc*

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[17] *Wright* claimed a new carpenter's level, having the new property and use of enhanced pitch measurement. Wright's new structure was a combination of elements that were in the prior art, but there was no suggestion in the prior art that this new combination might have the property and use discovered by Wright. The panel explained that it was unobvious to make this combination to

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solve the problem of increasing pitch measurement: a rationale appearing in dozens of decisions. *See, e.g., Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick Co.*, 730 F.2d 1452, 1462, 221 USPQ 481, 488 (Fed. Cir. 1984) ("Nothing in the references alone or together suggests the claimed invention as a solution to the problem of crushing rigidly massive scrap"); *In re Benno*, 768 F.2d 1340, 1347, 226 USPQ 683, 687 (Fed. Cir. 1985) ("[Benno] had to invent a solution to that problem . . . . Neither reference hints at his solution"); *Weather Engineering Corp. of America v. United States*, 614 F.2d 281, 287, 204 USPQ 41, 46-7 (Ct. Cl. 1980) ("The near unanimous approach by the courts is that '[tlhe prior art that is relevant in evaluating a claim of obviousness is defined by the nature of the problem confronting the would-be inventor'"); *In re Naber*, 494 F.2d 1405, 1407, 181 USPQ 639, 641 (CCPA 1974) ("even if one of ordinary skill in the art were moved to combine the references, there would be no recognition that the problem of combustible deposits had been solved"); *In re Aufhauser*, 399 F.2d 275, 281, 158 USPQ 351, 355 (CCPA 1968) ("as in *United States v. Adams*, 383 U.S. 39 (1966), what appellant had done was to *observe* an existing problem in the art which had not been solved by the prior art and then *combine* individually old concepts to solve that problem") (emphasis in original); *In re Rothermel*, 276 F.2d 393, 125 USPQ 328, 331 (CCPA 1960) ("Where the invention for which a patent is sought solves a problem which persisted in the art, we must look to the problem as well as its solution if we are to properly appraise what was done and to evaluate it against what would be obvious to one having the ordinary skills of the art."); *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 351 (CCPA 1959) (the prior art did not teach "how to solve the problems" faced by the inventor).

court today overrules *Wright*, without argument or briefing, and extends to mechanical devices the same theory of structural obviousness that the court now applies to chemicals, discarding the extensive precedent to the contrary.

The Court stated in *Thomas v. Washinqton Gas Light Co.*, 448 U.S. 261, 272 (1980):

> When rights have been created or modified in reliance on established rules of law, the arguments against their change have special force.

At least, the majority should explain its reasoning for so far-reaching a change of law and practice, affecting patentability of mechanical devices as well as chemical compounds and compositions.

D

The Statute

The court's *in banc* holding that similarity of chemical (and mechanical) structure suffices for *prima facie* unpatentability under 35 U.S.C. § 103, even when the applicant's newly discovered properties and use are not suggested in the prior art, departs from the precepts of not only section 103, but also sections 101 and 102. The court today imposes the same rebuttal burden on the applicant regardless of whether the prior art suggests the applicant's newly discovered properties.

Many other decisions apply similar reasoning, contrary to the majority's holding today.

35 U.S.C. § 103 requires that obviousness be determined in light of the prior art; section 102 fixes the limits of prior art; and section 101 requires utility as a condition of patentability. Giving consideration to the newly discovered properties and utility as well as the structure of a new chemical compound or composition (or a new device) implements the requirement of section 103 that the invention be viewed as a whole. *Jones v. Hardy*, 727 F.2d 1524, 1529, 220 USPQ 1021, 1025 (Fed. Cir. 1984) ("Failure to consider the claimed invention as a whole is an error of law"); *In re Kuehl*, 475 F.2d 658, 664-65, 177 USPQ 250, 255 (CCPA 1973) ("The test under § 103 is whether in view of the prior art the invention as a whole would have been obvious at the time it was made"). As the court remarked in *Lunsford*, it is unlikely that a person of ordinary skill would consider only the structures, and not the properties, described in the prior art.

The factual determination of the scope and content of the prior art, *see Graham*, 383 U.S. at 17, 148 USPQ at 467, is, of course, directed to prior art that meets the conditions of section 102. Section 102 describes prior art as what is published or otherwise known, including subject matter in public use or on sale. Not included is what is unknown, or knowledge that became known to the inventor through the inventor's own research:

> To rely on an equivalence *known only to the applicant* to establish obviousness is to assume that his disclosure is a part of the prior art. The mere statement of this proposition reveals its fallaciousness.

In re Ruff, 256 F.2d 590, 598, 118 USPQ 340, 347 (CCPA 1958) (emphasis in original). Indeed, this principle was recently modernized by Congress in 35 U.S.C. § 103,

second paragraph (1984) (prior art does not include certain information of common ownership). When the prior art does not suggest that similar structures will have the property and use that the inventor discovered, such fact can not be used to support rejection of the claims, even when the inventor included such information in the patent application.

35 U.S.C. § 101 requires that an invention be useful. The use of a chemical is the utilitarian property of that chemical. Since the essence of the *prima facie* case is that the holding of unpatentability is legally complete, the property and utility can not be ignored. Consideration of the utility of the claimed invention is as integral to the examiner's determination of *prima facie* unpatentability as it is to the decision after any rebuttal evidence is submitted.

The decisions I have discussed, and many others, illustrate the breadth of the court's exposure and the depth of the court's understanding, evolved over more than thirty years of application of these statutory principles. The weight of precedent, well exceeding the sampling I have reported, contradicts the majority's holding, and has established powerful legal principles that should not be discarded without sound reason. As discussed by the Supreme Court in *Vasquez v. Hillery*, 474 U.S. 254, 265 (1986),

> *stare decisis* [is] the means by which we ensure that the law will not merely change erratically, but will develop in a principled and intelligible fashion. That doctrine permits society to presume that bedrock principles are founded in the law rather than in the proclivities of individuals . . . .

The law of *prima facie* obviousness had developed over a long history, knitting the common threads of many carefully considered cases, leading to unifying criteria, in the tradition of the common law.

The court has made the wrong choice in reviving the *Hass-Henze* presumption of obviousness based on chemical structure without consideration of the obviousness of the applicant's new properties. This presumption was criticized, limited, and overruled, and has been superseded by judicial appreciation that a chemical "is, realistically and legally, a composite of both structure and properties", in the words of *Papesch*. I repeat the unifying criterion that for a new chemical compound or composition a *prima facie* case of obviousness is made when both (1) the new compound or composition is of closely related chemical structure to the prior art compound or composition, and (2) there is some suggestion or motivation arising in the prior art to make the new compound or composition in order to achieve the inventor's desired properties and utility. When these requirements were met, appropriate evidentiary showings could rebut the *prima facie* case. Only an occasional exception among past decisions eliminated the second part of this unifying criterion, and required proof of actual differences in properties when there was no suggestion in the prior art of the properties discovered by the inventor. Today the aberration becomes the law, reversing over thirty years of reasoned legal analysis.

The court does not state what new statutory interpretation is invoked, what new policy or principle is served, by rejecting the reasoning of so many decisions. The Supreme Court has remarked that

> any detours from the straight path of *stare decisis* in our past have occurred for articulable reasons, and only when the Court has felt obliged "to bring its opinions into agreement with experience and with facts newly ascertained."

Vasquez, 474 U.S. at 266 *(quoting Burnet v. Coronado Oil & Gas Co.*, 285 U.S. 393, 412 (1932) (Brandeis, J., dissenting)). When our court makes so dramatic a change of law, its *ratio decidendi* should be made known.

II

DILLON'S INVENTION

Dillon's patent application discloses and claims her discovery that the inclusion of certain tetra-orthoester compounds in hydrocarbon fuel compositions will reduce the emission of solid particulates (*i.e.* soot) during combustion of the fuel. The tetraorthoesters are a known class of chemical compound. It is undisputed that their combination with hydrocarbon fuels, for any purpose, is not described in the prior art; nor is their use to reduce particulate emissions from combustion of hydrocarbon fuels.

A

Dillon's Appeal to the Board

An applicant is required to appeal from all of the examiner's rejections that the applicant wishes to contest. 37 C.F.R. § 1.191(c). Dillon did so, and appealed the rejection of claims 2-14, 16-22, and 24-37. Of these, claims 24-35 were process (use) claims and the others were

composition claims. The appealed rejections were directed to the process and composition claims together, and were described by the board as follows:

> 1. Claims 24 through 37 under 35 U.S.C. 112, second paragraph.
>
> 2. Claims 2 through 14, 22 and 34 through 37 under 35 U.S.C. 103 as unpatentable over Sweeney '417 in view of Elliott, Howk, Kesslin, Speh, and Neves.
>
> 3. Claims 16 through 22, 24 through 33, 35, 36 and 37 under 35 U.S.C. 103 as unpatentable over Sweeney '267 or '417 in view of Elliott, Howk, Kesslin and Speh.

Board op. at 2. In its decision the board wrote that composition and method of use claims were at issue:

> The appealed subject matter relates to compositions comprising a hydrocarbon fuel and a particulate emissions suppressing amount of an organic orthoester, and a method of reducing particulate emissions by combusting such compositions.

Board op. at 1.

Dillon duly argued each ground of rejection, in accordance with 37 C.F.R. § 1.192, and the examiner responded. The board reversed the examiner's rejection on section 112, for all the claims rejected on that ground, and affirmed the rejections on section 103, for all the claims rejected on that ground. Each ground encompassed composition and process claims, without distinction. (The

board also discussed claims 13, 14, 34, 36, and 37, as to aspects not here material.)

Analyzing all the claims with respect to section 103, the board did not distinguish among them. For example, the board stated that

> differences between appellant's and the prior art's motivation for adding a component to a composition will not alone render the claimed *composition, or process* unobvious.

Board op. at 7 (emphasis added). The board further stated, again as to all the claims, that

> The mere recitation of a newly discovered function inherently possessed by *things and processes* in the prior art does not cause claims drawn thereto to distinguish over that prior art.

Board op. at 8 (emphasis added). Throughout its opinion the board did not imply that its analysis was directed solely to the composition claims. Indeed, the board stated that

> the *use* of the orthoesters recited in the appealed claims (wherein R is -OR) as hydrocarbon fuel additives would clearly have been *prima facie* obvious from the teachings of the Sweeney patents alone and the close chemical and structural relationship between Sweeney's and appellant's orthoesters[.]

Board op. at 6 (emphasis added). The majority errs in its statement that the board "review[ed] only the composition claims". The board considered and rejected all the claims, drawing no distinction as to the style of the claim.[18]

The rejection of all of the claims was appealed to us. The Commissioner has not argued otherwise, and both sides briefed and argued all the claims. As stated in the Commissioner's brief, the issue on appeal is whether "The claimed subject matter would have been *prima facie* obvious from the combined teachings of the references." Thus I must dissent from the court's affirmance of the board's rejection of the process claims simply because Dillon did not argue that the process claims are patentable even if the composition claims are not.

B

In re Durden

Before this court, Dillon properly did not discuss points that had not been raised by the examiner or the board. Since there had been no reliance on the law of *In re Durden*, 763 F.2d 1406, 226 USPQ 359 (Fed. Cir. 1985), and neither the examiner nor the board cited *Durden*, Dillon did not discuss the law of *Durden*.

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[18] The process claims were written in the style required by 35 U.S.C. § lOO(b), *see* n.15, *supra*. As explained in *In re Moreton*, 288 F.2d 708, 709, 129 USPQ 227, 228 (CCPA 1961), "[tlhis mere matter of form [i.e., claiming a new use as a process] should have no effect on patentability".

The Commissioner, in his answering brief before the Federal Circuit, argued for the first time that *Durden* provided additional authority for upholding the board's rejection of the process claims. The Commissioner stated that if the court decided to reverse the board's holding of unpatentability, the court should consider the effect of *Durden*. The panel, having reversed the board's holding, thus considered *Durden*, as the Commissioner requested; the panel simply observed that *Durden* does not apply to "use" claims.

However, the majority of this court, having affirmed the rejection of all the claims, has no basis for review on additional authority. Thus I can not join the majority's opinion interpreting *Durden*, for it is, in the event, *dictum*.

C

The Merits

Applying the guidance of precedent to Dillon's invention: the compositions are new,[19] and their property and use of reducing particulate emissions is not taught or suggested in the prior art. There is no objective teaching in the prior art that would have led one of ordinary skill to make this product in order to solve the problem that was confronting Dillon: to reduce soot from combustion of hydrocarbon fuels. There is no reasonable basis in the prior art for expecting that Dillon's new compositions

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[19] If a compound or composition is known, for any use or no use, it is not patentable. 35 U.S.C. § 102; *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 780, 227 USPQ 773, 777-78 (Fed. Cir. 1985).

would have the particulate- reducing property that she discovered. As shown in Part I, *ante*, structure, properties and use must be considered in determining whether a *prima facie* case under section 103 has been made.

The Sweeney references show the water-sequestration property of tri-orthoesters in hydrocarbon fuels, and the Elliott reference shows the water-sequestration property of tri- and tetra-orthoesters in hydraulic fluids (which are not hydrocarbons and not fuels). There is no suggestion in the prior art that would have led one of ordinary skill to make Dillon's new compositions in the expectation that they would reduce particulate emissions from combustion. No reference suggests any relationship between the properties of water-sequestration and soot-reduction. All this is undisputed.

Dillon raises the question of whether the Sweeney and Elliott references [20] are properly combinable, arguing that they are not in analogous arts. This question need not be decided, for even when combined these references offer no suggestion of the property of reducing particulate emissions from combustion. *In re Naber*, 494 F.2d 1405, 1407, 181 USPQ 639, 641 (CCPA 1974) ("even if one of ordinary skill in the art were moved to combine the references, there would be no recognition that the problem of combustible deposits had been solved").

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[20] The Board held that all the references other than Sweeney and Elliott were "merely cumulative", and did not discuss the Howk reference, on which the majority apparently now relies.

The board stated that it is inherent in Dillon's compositions that they would reduce particulate emissions, that Dillon "merely recited a newly discovered function inherently possessed" by the prior art. Arguments based on "inherent" properties can not stand when there is no supporting teaching in the prior art. Inherency and obviousness are distinct concepts. *In re Spormann*, 363 F.2d 444, 448, 150 USPQ 449, 452 (CCPA 1966):

> [T]he inherency of an advantage and its obviousness are entirely different questions. That which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown.

When the PTO asserts that there is an explicit or implicit teaching or suggestion in the prior art, the PTO must produce supporting references. *In re Yates*, 663 F.2d 1054, 1057, 211 USPQ 1149, 1151 (CCPA 1981).

The applicant's newly discovered properties must be considered in determining whether a *prima facie* case of unpatentability is made, along with all the other evidence. Neither structure nor properties can be ignored; they are essential to consideration of the invention as a whole. But Dillon's own discovery of the soot-reducing property of the tri-orthoester fuel composition is not evidence against her in determining whether the prior art makes a case of *prima facie* obviousness. *In re Wertheim*, 541 F.2d 257, 269, 191 USPQ 90, 102 (CCPA 1976) (applicant's own disclosures can not be used to support a rejection of the claims "absent some admission that matter disclosed in the specification is in the prior art"); *In re Ruff*, 256 F.2d at 598, 118 USPQ at 347 ("The mere statement of this proposition reveals its fallaciousness").

The board cited *In re Merck*, 800 F.2d at 1097, 231 USPQ at 379, in arguing that obviousness does not require absolute predictability. Obviousness does, however, require a sufficient relationship between the use taught in the reference and the use discovered by the applicant. In *Merck* the reference compound and the claim compound were both known to have psychotropic properties, supporting the holding of *prima facie* obviousness of the claimed specific antidepressant use. Applying this reasoning to Dillon's claims leads to the opposite conclusion, for Dillon's use to reduce soot from combustion is not suggested by the known use of the prior art compositions to scavenge water. (Only "use" claims were present in *Merck* -- again illustrating that the board, citing *Merck* against Dillon's claims, did not distinguish between composition and use claims in its analysis of Dillon's invention.)

In view of the complete absence of any suggestion in the prior art that Dillon's new compositions would have her newly discovered and unobvious property and use of soot reduction, I would reverse the rejection of the composition and the use claims.

The Commissioner raised the policy argument that Dillon is simply removing from the public an obvious variant of Sweeney's and Elliott's compositions, one that might be useful to scavenge water in fuels. In *Ruschig* the court had considered the argument, and remarked that the provision of adequate patent protection for the applicant's new compounds, not previously in existence and having a new and unobvious use, was favored over the "mere possibility that someone might wish to use some of them for some such [other] purpose". 343 F.2d at 979, 145 USPQ at 286. See also, e.g., *Chupp*, 816 F.2d at 647, 2 USPQ2d at 1440, wherein the court expressed a similar

view. This practical wisdom has been tested by long experience. It accords with judicial recognition that:

> Although there is a vast amount of knowledge about general relationships in the chemical arts, chemistry is still largely empirical, and there is often great difficulty in predicting precisely how a given compound will behave.

In re Carleton, 599 F.2d 1021, 1026, 202 USPQ 165, 170 (CCPA 1979).

Granting Dillon a patent on her invention takes away nothing that the public already has; and the public receives not only the knowledge of Dillon's discovery, for abandoned patent applications are maintained in secrecy, but Dillon is not deprived of an incentive to discover and to commercialize this new product for this new use.[21]

Conclusion

Following the weight of precedent, I would hold that a *prima facie* case of obviousness of a new chemical compound or composition requires consideration of not only the chemical structure but also the newly discovered properties, in light of the teachings and suggestions of the prior art. I would expressly reject the Commissioner's

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[21] The majority remarks that Dillon made "no attempt to argue the relative importance" of soot reduction and water sequestration. This dramatic new criterion, although presented in the *amicus* brief of the American Intellectual Property Law Association, should not be approved by this *in banc* court without discussion.

position that determination of the *prima facie* case is made regardless of the properties disclosed in the inventor's application.

Since there is no suggestion in the prior art references, alone or in combination, of the particulate-reducing property and use discovered by Dillon for her new compositions, a *prima facie* case of obviousness has not been made. Thus it is not necessary to patentability that Dillon establish that the prior art compositions do not possess the same soot-reduction property and use. I would reverse the board's rejection of claims 2-14, 16-22, and 24-37, all of the claims before us on appeal.

UNITED STATES
PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte **Diane M. Dillon**

Application for Patent filed November 15, 1984, Serial No. 671,570, which is a Continuation-in-part of Serial 453,494 filed December 27, 1982. Hydrocarbon Fuel Composition.

Michael C. Schiffer for appellant.

Primary Examiner - William R. Dixon, Jr.
Examiner - Margaret B. Medley.

Before Meros, Emery and Kimlin, Examiners-in-Chief.

Emery, Examiner-in-Chief.

This is an appeal from the final rejection of claims 2 through 14, 16 through 22 and 24 through 37, which are all the claims remaining in this application.

The appealed subject matter relates to compositions comprising a hydrocarbon fuel and a particulate emissions suppressing amount of an organic orthoester, and a method of reducing particulate emissions by

combusting such compositions. A copy of claim 2, which is illustrative of the appealed subject matter is appended to this decision.

The references relied on by the examiner are:

White	2,327,835	Aug. 24,1943
Howk et al (Howk)	2,840,613	June 24, 1958
Kesslin et al (Kesslin)	3,258,496	June 28, 1966
Speh et al (Speh)	3,876,708	Apr. 8, 1975
Elliott et al (Elliott)	3,903,006	Sept. 2, 1975
Neves	4,333,739	June 8, 1982
Sweeney (Sweeney '417)	4,390,417	June 28, 1983
Sweeney (Sweeney '267)	4,395,267	July 26, 1983

The appealed claims stand rejected as follows:

1. Claims 24 through 37 under 35 U.S.C. 112, second paragraph.

2. Claims 2 through 14, 22 and 34 through 37 under 35 U.S.C. 103 as unpatentable over Sweeney '417 in view of Elliott, Howk, Kesslin, Speh, White and Neves.

3. Claims 16 through 22, 24 through 33, 35, 36 and 37 under 35 U.S.C. 103 as unpatentable over Sweeney 267 or '417 in view of Elliott, Howk, Kesslin and Speh.

Based on a careful review of the record including the opposing positions and arguments of the appellant and of the examiner, we reverse the examiner's rejection under 35 U.S.C. 112, but agree with and will affirm the examiner's rejections of the appealed claims under 35 U.S.C. 103.

With respect to the rejection under 35 U.S.C. 112, the examiner urges (page 3 of Examiner's Answer),

> "Applicant's processes according to the specification and arguments of record are directed to a specific type of hydrocarbon and not just a 'hydrocarbon fuel' which may includes [sic] just alcohols or an alcohol blended fuel.
>
> The specification is objected to under 35 U.S.C. 112, first paragraph, as the specification as originally filed, does not provide support for the invention as is now claimed. The phrase 'said composition is essentially free of alcohol' [which] is found on page 5, lines 23-28, of the specification only provides support for the hydrocarbon fuel being free of alcohol, not the composition. Claim 1 which is canceled was not incorporated in the specification."

Section 112, second paragraph, merely requires that appellant's specification conclude with claims

> "partically pointing out and distinctly claiming the subject matter which applicant regards as his invention."

It is well established that the subject matter set out in the claims (note claim 1 for example) must be presumed, in the absence of evidence to the contrary, to be that "which the applicant regards as his invention." *In re Moore*, 439 F.2d 1232, 169 USPQ 236, 248 (CCPA 1971). The examiner has failed to particularly point out any such contrary evidence. We need only determine, therefore, whether the claims do, in fact, set out and circumscribe a particular area with a reasonable degree of precision and particularity. The subject matter and the metes and bounds of the present claims are certainly clear, even though the appealed claims vary is scope from each other, especially

when viewed in light of the specification, wherein the term "hydrocarbon fuel" is clearly defined and numerous examples given (at pages 3, 5 and 6, for examples. That is to say, even if the "enabling disclosure of the specification were not commensurate in scope with the subject matter encompassed by the appealed claims, that fact would not render the claims imprecise or indefinite or otherwise not in compliance with the *second* paragraph of §112. Thus, just as claims, which are of such breadth that they read on subject matter disclosed in the prior art should be rejected under §102 rather than under §112, claims which are of such breadth that they read on subject matter as to which the specification is non-enabling - should be rejected under the first paragraph of §112 rather that the second. *In re Borkowski*, 422 F.2d 904, 164 USPQ 642, 645, 646 (CCPA 1970). We are satisfied that a person of ordinary skill in the art would have no difficulty under the present circumstances understanding what is meant by "hydrocarbon fuels."

The examiner's objection to the specification, not being in the form of a rejection, is not before us. We note, however, that claim 1, which was cancelled, provided the only support in the specification for the language "wherein the composition is essentially free of alcohol." The unamended original claims are, of course, part of appellant's original disclosure. *In re Anderson*, 471 F.2d 1237, 176 USPQ 331, 332 (CCPA 1973). However, where those claims, which are apparently the only support for certain subject matter are cancelled, such subject matter should be incorporated into the specification, at least prior to issuance of any claims which might in part rely on such subject matter for support.

Turning now to the rejections of claims under 35 U.S.C. 103, Sweeney 417 teaches (columns 2 and 3, and the claims in column 8) dewatering a non-aqueous

hydrocarbon liquid such as diesel fuel by addition of a dewatering chemical selected from ketals characterized by the formula $R_2C(OR^1)_2$, acetals characterized by the formula $RCH(OR^1)_2$, and orthoesters characterized by the formula $RC(OR^1)_3$ wherein R may be alkyl, cycloalkyl ethers, 2-ethoxyethyl, carbomethoxymethyl, etc. Sweeney '417 also teaches (lines 17 to 21 of column 4 and claim 10 in column 8)

> "that it is possible to add an excess of dewatering chemical so that the liquid is 'bufferred' i.e. so that if the liquid is later contacted with additional water at a PH below 7, the dewatering chemical will react therewith."

Sweeney '417 teaches the ketal, acetal or orthoester reacts with the water at pH below 7 thereby forming alcohols.

Sweeney '267 teaches hydrocarbon fuels heavier than gasoline, such as *middle* distillate hydrocarbon fuels, may be extended by addition of immiscible alcohols in the presence of acetals, ketals or orthoesters as a co-solvent. Sweeney teaches the co-solvent may be added in amounts of 10-1000 volumes, preferably 10-100 volumes, per 100 volumes of hydrocarbon fuel [10 - (100 + 10) X 100 = 9%] (lines 46 to 52 of column 3). Sweeney discloses a typical diesel fuel composition containing 100 volumes of diesel fuel, 50 volumes of absolute ethanol and 16.7 volumes of 2,2-dimethoxy propane [16.7 (100 + 50 + 16.7) X 100 = 10%] (lines 63 to 68 of column 4). Sweeney 267 teaches the co-solvent stabilizes the fuel compositions preventing the formation of two phases due to the presence of water, by acting as a co-solvent and by reacting with water present thereby forming alcohols (column 4).

The Sweeney patents do not teach the use of the orthoesters recited in appellant's claims.

Elliott teaches the equivalence of orthoesters having the formula R^1-$C(OR_2)_3$ wherein R is hydrogen, an alkyl radical having 1 to 5 carbon atoms, *or the same as* -*OR*^{2}, which are particularly useful when employed in minor amounts, e.g., 1 to 50 percent by weight, preferably 1 to 30%, and more preferably 5 to 20%, as water scavengers in non-aqueous liquids (lines 53 to 58 of column 1).

Manifestly, the use of orthoesters wherein R is the same -OR^2 in Sweeney '417 and '267, as the co-solvent and water scavenger in hydrocarbon fuels, would have been suggested and *prima facie* obvious to one of ordinary skill in the art, within the meaning of 35 U.S.C. 103, at the time appellant's invention was made, based on the close structure and chemical similarity between the orthoesters wherein R is other than -OR and wherein R is -OR, and based on the teaching in Elliott of their equivalence as water scavengers.

While appellant argues (page 15 of Brief On Appeal) that Sweeney does not disclose appellant's orthoester, the question under 35 U.S.C. 103 is not merely what the references expressly or individually teach, but what they would have suggested to one of ordinary skill in the art at the time appellant's invention was made; the references must be considered in their entirety, and such consideration is not limited to the specific working examples. *In re Lamberti*, 545 F. 2d 247, 192 USPQ 278, 280 (CCPA 1976); *In re Fracalossi*, 681 F.2d 792, 215 USPQ 569, 570 (CCPA 1972). It is clear from combined teachings of these references (Sweeney and Elliott) that the orthoesters wherein R is -OR (alkyl esters of carbonic acid) would operate to remove water from nonaqueous

liquids by the same mechanism as the orthoesters of Sweeney.

Moreover, the use of the orthoesters recited in the appealed claims (wherein R is -OR) as hydrocarbon fuel additives would clearly have been *prima facie* obvious from the teachings of the Sweeney patents alone and the close chemical and structural relationship between Sweeney's and appellant's orthoesters; which latter orthoesters differ only by the inclusion of an additional -OR group, which group is recognized by Sweeney as the functional group in this class of compounds. Obviousness does not require absolute predictability. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375, 379 (Fed. Cir. 1986). Considering the very close structural and chemical similarity between the orthoesters recited in the appealed claims and the reference orthoesters, and the fact that the reference orthoesters were known in the art to be useful as additives for hydrocarbon fuels, such as diesel fuel, there is a reasonable expectation that the prior art compositions will have properties similar to the claim compositions. *In re Wilder*, 563 F.2d 457, 195 USPQ 426, 429 (CCPA 1977).

With respect to appealed claim 13, White teaches the well-known and obvious use of liquified propane in liquid hydrocarbon fuels (lines 15 to 25 of column 2); and that a small quantity of a water scavenger such as methanol may be added (lines 9 to 22 of column 2).

With respect to appealed claim 14, Neves teaches the well-known and obvious use of acetylene as a component in diesel fuels; and that where ethanol and hydrocarbon fuels are blended, the presence of a small amount of water may cause undesired phase separation, and a binding component, such as 4 to 10% benzene should be

added (lines 13 to 18 and 48 to 51 of column 3 and lines 55 to 65 of column 6).

The remaining references are deemed merely cumulative and will not be discussed separately.

Appealed claims 34, 36 and 37 recite that the fuel composition "is essentially free of alcohol", which is defined in the specification as preferably a "fuel [that] contains less than 1 volume percent alcohol based on the volume of hydrocarbon fuel" (lines 14 to 31 of page 5). However, Sweeney '417 teaches adding orthoesters to hydrocarbon fuels which do not contain alcohol as additives. Sweeney 267 discloses the amount of alcohol added may be as low as 5 volumes per 100 volumes of hydrocarbon (lines 51 to 63 of column 2).

Before proceeding we note that insofar as appellant has not chosen to separately argue the patentability of appealed claims under 35 U.S.C. 103, they stand or fall together. *In re Kaslow*, 707 F.2d 1366, 1175, 201 USPQ 67, 70 (CCPA 1979).

While appellant argues that Elliott is non- analogous art (page 11 of Brief On Appeal), Elliott is relied on for its teaching of the equivalences of various orthoesters as water scavengers in non-aqueous liquids, which is clearly analogous to their use in the Sweeney patents. Contrary to appellant s arguments (pages 15 and 18, for example, of the Brief On Appeal), there is, as discussed above, abundant suggestion and incentive expressed in the references for using orthoesters wherein R is -OR in Sweeney; e.g., the close structural and chemical similarity of these and Sweeney s orthoesters, and Elliott's teaching of their equivalence as water scavenging agents.

Appellant urges that her purpose for adding the orthoester is remote from that of the references (page 21 of Brief on Appeal). However, it is well established that differences between appellant's and the prior art's motivation for adding a component to a composition will not alone render the claimed composition, or process, unobvious. To establish unobviousness those differences must be reflective of unexpectedly superior properties or advantages as compared with the prior art compositions. *In re Lintner*, 458 F.2d 1013, 173 USPQ 560, 562 (CCPA 1972).

Furthermore, the explicit appreciation of appellant's particular problem is not dispositive of the issue of obviousness. The mere recitation of a newly discovered function inherently possessed by things and processes in the prior art does not cause claims drawn thereto to distinguish over that prior art. Appellant cannot remove from the public domain via a patent that which is inherently taught by the prior art, i.e., the use of orthoesters as additives to hydrocarbon fuels. *In re Wiseman*, 596 F.2d 1019, 201 USPQ 658, 661 (CCPA 1979); *In re Best*, 562 F.2d 1252, 195 USPQ 430, 433 (CCPA 1977); *In re Oelrich*, 666 F.2d 578, 212 USPQ 323, 324 (CCPA 1971); by analogy, *In re King*, 801 Fed. Rep., 2nd Series 1324 (Fed. Cir. 1986).

Furthermore, while not presently applied by the Examiner (and we decline at this time to act under the provisions 37 CFR 1.196(b)), as pointed out in our decision mailed February 25, 1987 in appellant's parent application Serial No. 453,494, the U.S. patent 3,869,262 issued March 4, 1975 to Mayerhoffer et al (Mayerhoffer)

> "discloses a fuel for internal combustion engines, providing reduced unburned emissions such as CO, NO_2 and aldehydes,

comprising gasoline or other hydrocarbon fraction and at least one, preferably at least three, oxygen containing compounds including an acetal and at least two members selected from lower alcohols, acetals and acetates. Mayerhoffer discloses (column 3) that the emission of harmful substances can only be effected by reducing the air requirement and the combustion temperature with the aid of oxygen- containing compounds. In addition, by using oxygen-containing compounds with a greater combustion speed, combustion equilibrium can be more rapidly achieved and thus the efficiency further increased.

Only a few of the many organic oxygen-containing compounds can be termed suitable for use as an additive for economic and physical reasons. The additive must not alter the fuel to such an extent that it no longer complies with the standards. Furthermore, the minimal quantities must be as effective as possible.

It is known that by the addition of oxygen- containing compounds, especially alcohol, an improvement in combustion and thus in knocking behavior, is obtained. On account of the danger of separation at low temperature it is not possible to add alcohol alone.

Mayerhoffer further discloses the fuel contains 0.2 to 12 vol. %, particularly 0.5 to 10 vol. % of these oxygen-containing additives; and may contain up to 0.4 vol. % water (lines 16 to 34 of column 4 and lines 17 to 27 of column 7)."

Appellant urges (paragraph bridging pages 22 to 23 of Brief On Appeal)

> "that her invention is patentable on the basis of unexpected results."

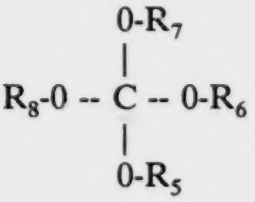
However, the present record is devoid of any convincing objective evidence supporting such a conclusion. Mere conclusory statements unsupported by objective evidence are entitled to little weight. *In re Greenfield*, 571 F.2d 1185, 197 USPQ 227, 229 (CCPA 19?8). We have carefully reviewed appellant's examples but find no convincing showing establishing unexpected results of the presently claimed compositions over the compositions of the Sweeney patents. For example, Appellant's Examples III to XII compare diesel engine runs using #2 diesel fuel with and without added amounts of trimethyl orthoacetate (an orthoester of the formula taught by Sweeney), which runs were carried out under various conditions including at different relative humidities; with percent reductions in particulate emissions of 14.61, 10.26, 29.90, 18.57, 12.01, 18.09, 11.30, (0), 27 and 27. Appellant's Examples XIII to XVIII compare diesel engine runs using #2 diesel fuel with and without added amounts of tetramethyl orthocarbonate, (an orthoester encompassed by the appealed claims), which runs were carried out under various conditions, with percent reductions in particulate emissions of 6.7, 7.9, 10.8, 16.6, 12.8 and 10.3. The average percent reductions in particulate emissions for #2 diesel fuel with trimethyl orthoacetate (with in Sweeney's orthoester formula) were apparently substantially greater than for tetramethyl orthocarbonate (an orthoester encompassed by appealed claims). No data with #2 diesel fuel is given for any other orthoesters. Appellant's Examples XIX to XXIV only give data for propane with tetramethyl orthocarbonate, with resulting percent particulate reductions of 1.1, 5.0, 1.5 and 5.1. No data is pre-

sented for propane with trimethyl orthoacetate or any other orthoester. Also, no objective evidence is presented to establish any different or unexpected results from limiting the amount of alcohol in appellant's claims to less than 1% alcohol. The data of record certainly fails to establish any unexpectedly superior results of appellant's compositions over those taught by the references. Appellant has not advanced sufficient convincing arguments and persuasive objective evidence of nonobviousness to outweigh the evidence of obviousness of the appealed subject matter. *In re Johnson*, 747 F.2d 1456, 223 USPQ 1260 (Fed. Cir. 1984); *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984); *In re Rinehnrt*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976).

AFFIRMED

APPENDIX

2. A composition comprising:
a hydrocarbon fuel; and
a sufficient amount of at least one orthoester so as to reduce the particulate emissions from the combustion of the hydrocarbon fuel, wherein the orthoester is of the formula:



wherein R_5, R_6, R_7, and R_8, are the same or different monovalent organic radical comprising 1 to about 20 carbon atoms.

United States Court of Appeals for the Federal Circuit

88-1245

IN RE DIANE M. DILLON

JUDGMENT

ON APPEAL from the U.S. PATENT & TRADEMARK OFFICE BOARD OF PATENT APPEALS & INTERFERENCES in CASE NO(S). 671,570.

This CAUSE having been heard and considered, it is ORDERED and ADJUDGED: *AFFIRMED.*

ENTERED BY ORDER OF THE COURT

/s/ Francis X. Gindhart

Francis X. Gindhart, Clerk

DATED: November 9, 1990

ISSUED AS A MANDATE: November 30, 1990

STATUTE INVOLVED

35 U.S.C. § 103

§103. Conditions for patentability; non-obvious subject matter

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

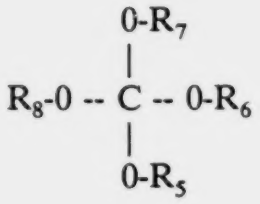
Patentability shall not be negatived by the manner in which the invention was made. Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

(As amended Nov. 8, 1984, Pub.L. 98-622, Title I, § 103, 98 Stat. 3384.)

The Denied Patent Claims

What is claimed:

2. A composition comprising: a hydrocarbon fuel; and a sufficient amount of at least one orthoester so as to reduce the particulate emissions from the combustion of the hydrocarbon fuel, wherein the orthoester is of the formula:



wherein R_5, R_6, R_7, and R_8 are the same or different mono-valent organic radical comprising 1 to about 20 carbon atoms.

3. The composition of claim 2 wherein the orthoester is present in a sufficient amount so as to reduce the particulate emissions from the combustion of the fuel by at least about 5 weight percent.

4. The composition of claim 2 wherein the orthoester is present in an amount from about 0.05 to about 49 volume percent of the total volume of the hydrocarbon fuel and orthoester.

5. The composition of claim 2 wherein the amount of orthoester is from about 0.05 to about 9 volume percent of the total volume of hydrocarbon fuel and orthoester.

6. The composition of claim 3 wherein R_5, R_6, R_7, and R_8 are the same or different mono-valent radical derived from an aliphatic, alicyclic, or aromatic compound comprising from 1 to about 10 carbon atoms.

7. The composition of claim 5 wherein R_5, R_6, R_7, and R_8 are the same or different mono-valent radical derived from an aliphatic, alicyclic, or aromatic compound comprising from 1 to about 10 carbon atoms.

8. The composition of claim 5 wherein R_5, R_6, R_7, and R_8 are the same or different mono-valent radical derived from an aliphatic or alicyclic compound comprising from 1 to about 10 carbon atoms.

9. The composition of claim 5 wherein R_5, R_6, R_7, and R_8 are the same or different alkyl, alkenyl, or alkynyl radical comprising from 1 to about 10 carbon atoms.

10. The composition of claim 5 wherein the orthoester is tetramethyl orthocarbonate.

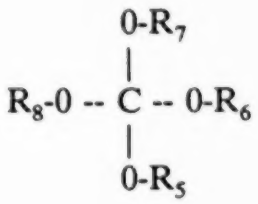
11. The composition of claim 9 wherein the hydrocarbon fuel is a petroleum middle distillate fuel.

12. The composition of claim 10 wherein the hydrocarbon fuel is a petroleum middle distillate fuel, propane or acetylene.

13. The composition of claim 9 or 10 wherein the hydrocarbon fuel is methane, ethane, propane, acetylene or natural gas.

14. The composition of claim 9 wherein the hydrocarbon fuel is acetylene.

16. A composition comprising: a middle distillate hydrocarbon fuel; and from about 0.05 to about 9 volume percent of at least one orthoester based upon the volume of hydrocarbon fuel and orthoester, wherein the orthoester is of the formula:



wherein R_5, R_6, R_7, and R_8 are the same or different monovalent organic radical comprising 1 to about 20 carbon atoms.

17. The composition of claim 16 wherein R_5, R_6, R_7, and R_8 are the same or different mono-valent radical derived from an aliphatic, alicyclic, or aromatic compound comprising from 1 to about 10 carbon atoms.

18. The composition of claim 16 wherein R_5, R_6, R_7, and R_8 are the same or different mono-valent radical derived from an aliphatic or alicyclic compound comprising 1 to about 10 carbon atoms.

19. The composition of claim 16 wherein R_5, R_6, R_7, and R_8 are the same or different alkyl, alkenyl, or alkynyl radical comprising 1 to about 10 carbon atoms.

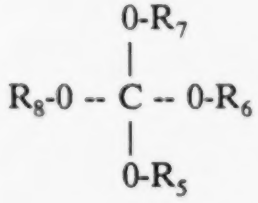
20. The composition of claim 18 wherein the orthoester is present in an amount from about 0.1 to about 5 volume percent of the total volume of the hydrocarbon fuel and orthoester.

21. The composition of claim 19 wherein the orthoester is present in an amount from about 0.1 to

about 5 volume percent of the total volume of hydrocarbon fuel and orthoester.

22. The composition of claims 2, 3, 5, 7, 9, 10, 16, 17, 18, 19, or 21 wherein the hydrocarbon fuel is a diesel fuel.

24. A method of reducing the particulate emissions from the combustion of a hydrocarbon fuel comprising combusting a mixture of the hydrocarbon fuel and a sufficient amount of at least one orthoester so as to reduce the particulate emissions, wherein the orthoester is of the formula:



wherein R_5, R_6, R_7, and R_8, are the same or different monovalent organic radical comprising 1 to about 20 carbon atoms.

25. The method of claim 24 wherein the orthoester is admixed with the hydrocarbon fuel in a sufficient amount so as to reduce the particulate emissions by about 5 percent by weight.

26. The method of claim 24 wherein the orthoester is admixed with the hydrocarbon fuel in an amount from about 0.05 to about 49 volume percent of the total volume of hydrocarbon fuel and orthoester.

27. The method of claim 24 wherein the orthoester is admixed with the hydrocarbon fuel in an amount from about 0.05 to about 9 volume percent of the total volume of hydrocarbon fuel and orthoester.

28. The method of claim 24 wherein the orthoester is admixed with the hydrocarbon fuel in an amount of from about 0.1 to about 5 volume percent of the total volume of hydrocarbon fuel and orthoester.

29. The method of claim 27 wherein R_5, R_6, R_7, and R_8 are the same or different mono-valent radical derived from an aliphatic or alicyclic compound comprising from 1 to about 10 carbon atoms.

30. The method of claim 27 wherein R_5, R_6, R_7, and R_8 are the same or different alkyl, alkenyl, or alkynyl radical comprising from 1 to about 10 carbon atoms.

31. The method of claim 27 where the orthoester is tetramethyl orthocarbonate.

32. The method of claims 24, 25, 28, 29 or 31 wherein the hydrocarbon fuel is diesel fuel.

33. The method of claim 32 wherein the hydrocarbon fuel is combusted in a diesel engine.

34. The method of claim 24, 25, 27, 28, 29, 30 or 31 wherein the hydrocarbon fuel is essentially free of alcohol.

35. The method of claim 34 wherein the hydrocarbon fuel is a diesel fuel and the combustion takes place in a diesel engine.

36. The composition of claim 2, 3, 5, 9, 11, 16, 18, or 20 wherein said composition is essentially free of alcohol.

37. The composition of claim 2, 3, 5, 9, 16, 18, or 21 wherein said composition is essentially free of alcohol and said hydrocarbon fuel is a diesel fuel.